THE

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ELECTRICAL REVIEW.

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ELECTRICAL ACCIDENTS IN 1911.

FEW documents are of greater human interest to the electrical engineer engaged in practical work than the annual report of H.M. Electrical Inspector of Factories. Therein Mr. G. Scott Ram places on record, clearly and concisely, the tale of accidents that have been brought to his notice during the year, compares it with previous records, and discusses the causes of such misadventures. But he does not stop there: he goes on to show, as far as possible, *why* these accidents happen, and to offer sound advice for their prevention in the future; and we have no doubt that many a workman unconsciously owes his life to the sagacious comments and unsparing criticism often embodied in these reports.

One of the most singular features of the report is the frequency of accidents to skilled persons engaged in cleaning high-pressure switchgear—accidents that often prove fatal. Of all parts of an electrical installation, the switchboard is at once the most exposed and the most respected. Everybody about a high-pressure station is well aware of the hidden dangers of the switchboard—hidden, because electricity offers no indication of its presence. Elaborate safeguards are prescribed, to be observed before any person is given access to the cells containing the switchgear—yet, in spite of the best intentions, sometimes the most obvious and elementary precautions are omitted, with disastrous results.

There is clearly a great want for a really effective and reliable indicator of the fact that an electric conductor is alive. Various devices have been put forward for this purpose, but apparently they do not adequately meet the case—otherwise they would surely be used. Unfortunately, however, very many of the accidents are to be ascribed to carelessness on the part of the person—often highly competent and experienced—who becomes the victim of the accident, and thus pays for his own slackness.

It will be noticed that the number of accidents has appreciably, though but slightly, increased, and in view of the continuous expansion of the electrical industry in all directions, this is not surprising; it is, however, gratifying to observe, from curves given by Mr. Ram, that while the use of electricity for motive power in factories has steadily increased during the last 10 years, the number of accidents occurring annually has been almost at a standstill since 1907—the year in which the draft regulations of the Home Office were issued. Until then they were increasing at the same rate as the use of electricity, and if there had been no check, they would now have numbered twice as many as they did last year. This is a result upon which the Home Office, and Mr. Ram himself, may well be congratulated.

As usual, a considerable number of accidents were due to the use of defective hand lamps and other portable apparatus not efficiently earthed, two of them being fatal at 250 volts D.C. and 220 volts A.C. respectively.

The impossibility of providing against all conceivable

eventualities is well illustrated by a fatality which occurred in connection with a dock crane. The trolley wires were enclosed in a conduit with a longitudinal slot, and were apparently inaccessible; yet a man who had dropped something into the conduit put his hand through the slot and touched the conductors.

We regret to note that in many cases compliance with the Home Office Regulations is still avoided, sometimes deliberately and with full knowledge of the fact. Fuses of dangerous types are being installed, even in new work. In some instances fittings, such as portable hand lamps, though described as "of Home Office pattern," and honestly intended to comply with the Regulations, have been found to be radically defective through the ignorance of the designer; indeed, some of the examples described by the Inspector are amazing in their absolute neglect of the most elementary precautions against accident. Many of these instances are presumably due to incompetence in the drawing office; draughtsmen are notoriously underpaid, and many of them are devoid of practical experience, not only in the use of the apparatus they design, but even in the workshop. It is not their fault, and we do not blame them, but their employers. Electrical apparatus ought to be designed by competent men, and no design should leave the drawing office until it has been rigidly scrutinised and passed by an experienced electrical engineer—not merely by a mechanical draughtsman, who may have no acquaintance with the conditions under which the apparatus will be used. But even in the case of important plant—such as high-pressure switchgear—serious defects are reported; for example, on a large main switchboard designed by a firm of consulting engineers, the "isolating" switches were found to be not between the oil switches and the bus-bars, but on the other side of the oil switches. Surely this is the limit.

But, while Mr. Ram necessarily deals mainly with the faults which he has discovered, it is consoling to note his remark that there is an increasing number of examples of excellent work in electrical works and factories, and the general standard is much better than it was a few years ago. While we can never expect to see bad work and carelessness wholly abolished, there is clear evidence of a great improvement on the whole, and we hope to see the accident curve not merely horizontal, but actually trending downwards, whilst the output curve becomes even steeper.

THE RULE OF LAW.

In many of the text-books on Constitutional Law appears the statement that England's claim to greatness is founded upon the respect of her people for the law, If this is a true saying—and we have no reason to doubt that it is—the present state of affairs in the industrial world must cause people to look forward to the future with grave misgiving. We appear to be abandoning those principles of government by which in the Empire beyond the seas a handful of Englishmen is able to govern millions of less civilised races. We once heard Lord Curzon of Kedleston, with the honours of his Viceroyalty fresh upon him, say that ours was not a military rule in India; it was not the English legions which won the respect and admiration of the native population. "It is," he added, "the administration of even-handed justice according to the best traditions of English law."

It is, indeed, by a sober and temperate, yet unflinching, application of English principles of justice that the native is to be controlled. Have we reached such a pitch of excellence nearer home that we can afford to "draw off the watch dog" whose duty it is to preserve public peace and order?

A curious state of things has been revealed in the papers during the last few weeks. In one column one reads of a gross and deliberate outrage perpetrated by a band of lusty strikers upon a weak and defenceless old man. In another, one learns that the Home Secretary—who is the ostensible custodian of public order—has made the following statement in the House of Commons:—"No circumstances have arisen which render it necessary to call out the military." What new form of justice is it that is to be administered or not, according to the degree of interference with the liberty of the subject which has taken place? If 20 men have their heads broken; if 30 dockers are prevented from pursuing their lawful avocation; if 50 women and children are starving to death—prove the attainment of any one of these standards, and we shall set the law in motion, but not before!

Moreover, in considering the amount of harm which is being done, the assaults or other overt acts of a violent picket are but a superficial indication of what is really taking place. The fear of being intimidated is, of itself, an influence well calculated to make a man keep away from his work. Addressing a deputation which recently waited upon him, Mr. Asquith pointed out that there was nowadays less violence in trade disputes than there was 20 years ago. Mr. Baird, to whom the observation was addressed, said: "I think the probable reason is that those who are anxious and willing to work are so intimidated nowadays that they will not move at all."

In what sense, then, has the rule of law been ruthlessly abandoned? Let us glance at the evolution of the law as affecting trade combinations since 1800. In that year it was declared by the Combination Act that every combination for obtaining an advance in wages or altering the hours of work, or decreasing the amount of work, or preventing any person employing whomsoever he might think fit to employ, or for preventing workmen hiring themselves, of attempting to induce workmen to leave their work, was illegal; and not only illegal, but punishable criminally. In 1824 the criminal liability of combination in advancing or fixing the rates of wages was removed. In 1859 peaceful persuasion to induce workmen to abstain from working in order to raise their wages was, for the first time, declared lawful. So much for criminal liability. As regards civil liability, in the reign of Henry VIII Trade Unions were declared unlawful, as being in restraint of trade. Not only are Trade Unions lawful bodies at the present day, but they are above the law, in the sense that they are not to be made responsible for torts which may be committed or instigated by them. And picketing has been declared to be legal by Act of Parliament.

The most melancholy aspect of the present situation is that the Government stoutly refuses to interfere even in a matter where interference would be at once warranted and effective.

There are two kinds of intimidation, open and secret. A man may be made miserable at his work and in his home, although no overt act can be proved against his persecutors. The open act of oppression can be prevented by methods which are swift and sure; but which of us can suggest a remedy for that petty tyranny and spite which can reduce a man to the depths of misery. In refusing that measure of relief which they can afford, the powers that be appear to have forgotten the lines of Dr. Johnson when he wrote:—

> **How small of all that human hearts endure,**
> **That part which laws or Kings can cause or cure!**
> **Still to ourselves in every place consigned,**
> **Our own felicity we make or find.**
> **With secret course, which no loud storms annoy,**
> **Glides the smooth current of domestic joy.**

Mr. Asquith is prepared to admit the existence of such forms of intimidation. In his address to the deputation he said: "Do not let it be supposed that, if you have people who are disposed to practise intimidation, by penalising one particular form of it you get rid of other forms of it. Intimidation is a very subtle thing, and may be exercised in many different ways. And although anything in the nature of violence and hustling is comparatively easily detected and easily dealt with, there are, as we all know, other methods by which people who are evilly enough disposed, can coerce the free will of their neighbours and their fellow employés."

If one were to judge by the results of another form of Government interference—viz., so-called conciliation between masters and men during recent years, it must be confessed that such interference is not very satisfactory. The number of strikes has not diminished. The arrogance of the demands made by labour has also increased; and there is no evidence—indeed, the evidence is all the other way—that the award of a Government arbitrator makes for lasting peace.

The mediator appointed by Government is by a natural tendency the apostle of compromise. Now compromise involves the proposition that each party gives and takes something. Consequently, if there is a strike, and the strikers are content to submit the matters in dispute to the mediation of a Government official, they gain something, even if they do not gain all. In the result they are encouraged to strike again, until the whole of their demands are conceded.

It is not surprising that, in the disheartenment created by all these trade disputes, employers should sigh for the good old days when every man was free to dispose of his capital or labour as he willed. We are convinced that whether the time is near or distant, those days will come again, and the working classes, having been taught in the stern school of experience, will ultimately find that there is little to be gained by strikes and continual disputes with their employers.

Fixing Machinery.

IT is a quite common clause in a contract for a machine maker to contract to fix his machinery upon foundations to be provided. Such foundations are now usually in the form of a concrete block, in which are embedded certain vertical boxes of light wood, into which the holding-down bolts are fixed by being grouted up with cement mortar. If a machine supplier engages to "fix," ought this word "fix" to include the whole of the operation of fixing, including the supply and running of the cement grout?

Some contractors say that the grouting is part of the supplying of the foundation. If this construction be allowed, then the fixing of a machine means nothing more than levelling it on a bed by means of wedges, its holding-down bolts simply hanging loose in the bolt sockets. But does not the word "fix" mean to render immovable? and how can the machine be immovable if the bolts are hanging loose? And is not a holding-down bolt a part of the machine? Holding-down bolts are always furnished by the machine or engine builder, and he is, therefore, bound to fix such bolts.

Some engineers say that on no account would they allow their machines to be grouted except by themselves, and this seems to be a proper attitude. Again, if machines are to be grouted at the cost of the client, the machine builder is not responsible for failure if the grouting is badly carried out. It appears to be a correct view to take, to demand that the machine builder shall certainly grout up his own bolts. One would also think that he should construct foundations, for he might fall back on a "bad foundation" to cover a failure of his machine, especially if the foundation did not agree exactly with the drawing he had supplied.

Since there is, perhaps, liable to be a divergence of opinion, would it not be well that engineers should more particularly define the limits between two separate contractors? Thus, a foundation might be specified to be provided not more than $1/n$ of an inch low, and with bolt holes to template to be provided by machine builder, and the machine builder to be called on to fix and grout, or otherwise properly bed his machine, and be responsible for bolt fixing also.

It is not always that the demarcation word admits of such a clear definition as the word "fix" seems to do, and it is thus the more necessary to insert a special clause that shall define without risk of ambiguity where responsibility ends and begins.

Years ago, before machine beds were so easily fixed and bedded on wedges and grout, the fixing of a machine was a bit of careful work which required time. Using planks as levers, the bed was rubbed to and fro on the ashlar masonry of millstone grit of which all beds were built. The blackened stone was dressed down, and a second rubbing was done, the bed being tested at every operation, and the stone dressed away until finally the bed was level, and the stone surface fairly well blackened all over, showing good contact and support. No grout or packing was used; the cast-iron was direct upon the grit. All bolt fixing was done by the machine builder, and there is this precedent to show that fixing always has included the bolts.

THE I.M.E.A. CONVENTION, 1912.

(*Concluded from Vol.* 70, *page* 1037.)

The Trading Departments and Rate Relief.

WE are very glad to see this most important subject taken up by Mr. Pearce, in whose great city of Manchester the matter is just now a very live consideration.

Mr. Pearce considers with great care the arguments put forward by those who desire to annex profits in relief of rates. Of course he deals with the subject mainly from the point of view of the electricity supply department. The use of tramcars being optional, and their income being derived partly from visitors, it may be fairly argued that some of their profits should go to the community in this direct manner. This is further rendered desirable by the fact that the debt charges on road widening expenditure, due to the tramways, are borne by the rates.

The chief argument of the profit-takers is that the credit of the ratepayers is pledged; they have to take the risk and should, therefore, take the money earned. Mr. Pearce rightly points out, however, that this money should be considered as the underwriters' premium, and should not be spent, but invested so as to reduce the risk. Thus, if there is any profit it should be kept by the department, and if there is no profit—why, then there is nothing for distribution. Of course, if the undertaking has, in previous years, been assisted financially out of the rates, the money so received should be paid back as soon as possible.

Mr. Pearce next goes on to say that, as local authorities raise money at rates some $1\frac{1}{4}$ per cent. better than do companies, this advantage might fairly be handed over to the rates. We do not greatly object to this, though it is really "fortune of war," and we think the money would be better employed by being kept in the business.

The argument as to the use of highways for distributing mains holds very little water. The undertaking is itself a ratepayer of no mean order, and is entitled to this privilege.

The next argument is that absence of profit-making leads to mismanagement. We have little patience with so absurd a statement. It convicts itself the moment it is uttered. We know that it is the custom to jeer at officialdom, whether municipal or civil; but it would be false to say that, because the Navy, the Army, the Civil Service (with the exception of the Post Office), the police, the highways department, the cleansing department, the education committee, and many other departments of the State or town are not profit-earning, but money-spending departments—that for this reason they are mismanaged. Yet this is the logical conclusion of the "argument." The fact is that officials, as a whole, earn all the money they get, and the outcry against them is largely due to envy and misrepresentation.

Mr. Pearce thinks it seems impossible to justify charging consumers with more than—

(*a*) Production, distribution, and management costs.

(*b*) Debt redemption charges, supplementing these where necessary to make them equivalent to true depreciation.

(*c*) Interest charges.

(*d*) Underwriting charges (relief of rates) at 1 to $1\frac{1}{4}$ per cent.

We think this is not unfair, though, as we said above, item (*d*) would be better if merged in item (*b*).

In general Scotch law, the rates may not be relieved by trading profits, and in the Potteries Federation Act this provision was imposed by Parliament.

Next Mr. Pearce says it is a point of contention whether relief should be calculated on the total capital or on the outstanding debt; he himself comes to the conclusion that the latter is the correct basis. This outstanding debt is the total risk, and even this is only true if the assets are assumed to be valueless.

While we agree that municipal electric and gas supplies are not fit subjects for any beyond the slightest taxation, we do not think it is true that "there is no justification for indirect taxation upon one part of the community as a means of affording relief to the direct rating of the whole community. This is done every day in Imperial taxation, and we suppose that is justification enough.

Quoting from both the *Municipal Journal* and the *Accountant*, Mr. Pearce points out that if money is taken from the rates, this delays Imperial contributions, and he goes on

to say that Mr. Haward, Comptroller to the L.C.C., estimates the claim of the local authorities against the Imperial exchequer for services which are national in character at £7,500,000 per annum. Of course, all this money has to come from the pockets of the community as a whole, and theoretically it makes little difference whence it comes; but it must not, any part of it, be obtained by robbing the electricity supply departments. If the Government paid more it would tend to centralise local administration; and while we think that in many ways this would be an advantage, yet there is no doubt that fierce opposition would be aroused.

The great thing to do, in order to safeguard the ratepayers completely, is to see that the outstanding debt is less than the value of the assets. This does away with all risk, and all justification for payment of money in relief of rates is thus removed. Mr. Pearce rightly emphasises the indirect benefits gained by low charges for electricity in attracting new industries and retaining old ones, besides the lessening of the smoke evil. Those are the advantages of cheap electricity, and they cannot be estimated at so many pence in the £.

In a recent article on Mr. Wilkinson's presidential address, we said that the only reference made, in any of the papers this year, to meters, was in Mr. Pearce's paper. He thinks it an advantage that services, meters, instruments, tools, spare parts, &c., should be bought out of revenue, and where the finances of the undertaking allow of it, there is much to be said in favour of this course. The policy of the L.G.B. is to grant meter loans for five years, thus making it better to buy at once out of revenue. This period is rather short, for good meters will last quite 10 years; but meters are nearly always neglected, and good meter men are scarce. An engineer has no right to expect good meters at the prices which have prevailed in recent years. "I buy a meter for about sixteen shillings, it lasts for two years, and I scrap it. That is economy." So the fallacious argument goes. It is forgotten that during the whole of its life such a meter is getting worse and worse, and losing revenue—the life-blood of the undertaking. This is, as we have pointed out, perhaps the most important of all the directions in which economy can be pursued with the certainty of an immediate and ample return on the expenditure of time and money incurred. It is easy to lump together all the missing units under the heading "unaccounted for," but how many of those units represent a loss of two or three pence each?

The whole subject is full of interest, and we hope that in the future the economic questions attaching to the profession will be more prominent at these conventions than they have been in the past. It is often the case, however, that the expression of any decided views on the part of an engineer attracts hostile notice from members of his town council. As the engineer is probably far better able to think upon the subject than the majority of the councillors of to-day, this fact, besides being cruel and unjust to the engineer, is of grave disadvantage to the community.

The Limitation of Rate Relief from Trading Profits.

By S. L. Pearce, Chief Electrical Engineer, Manchester Corporation.

(Abstract.)

The object of this paper is to emphasise the need which exists for a definite pronouncement from Parliament as to the extent to which local authorities should be permitted to relieve the rates from the profits of their trading departments.

First and most important of the arguments usually advanced in advocacy of rate-relief is that the credit of the ratepayers being pledged for the trading undertakings, the ratepayers are in the position of underwriters and as such, bearing the risk of any losses that may be made by those undertakings, they are entitled to some return for their services.

But experience has shown that the risks of losses on well-established supply undertakings are slight.

In any case it is surely absurd to spend the premium which, if the underwriting risk be a real one, ought to be set aside to meet the loss. It will not be seriously contested that the proper safeguards to employ to conserve the ratepayers' interests should be more adequate [reserve funds in addition to the statutory sinking funds. But under existing methods the ratepayers of to-day are consuming what ought to be available for ratepayers of perhaps 10 or 20 years hence. The risk, such as it is, would largely fall on the next generation, and as they cannot receive present profits, the only way to help them is to prevent the risk occurring by providing adequate reserve and renewals funds.

The author admits that when an undertaking in the first few years of its existence has made losses, which have fallen on the rates, those losses should be liquidated as and when profits are available in addition to such reasonable annual return as may be made to the ratepayers.

Seeing, however, that local authorities undoubtedly raise money more cheaply than companies do, it may be asked is there any valid reason why the extent of advantage measured by credit should not be accepted as the full measure of rate-relief. Turning to a neutral source, we find that the *Accountant* puts the balance of advantage in favour of the local authority raising money, as compared with companies formed to furnish the supplies now under review, at about 1¼ per cent. per annum.

Next, and of much less importance, are the arguments that trading departments enjoy the almost unrestricted use of the highways for distributing mains.

Against these may be put the fact that the main object of municipal trading is the general convenience of the public.

A further argument used is that absence of profit-making leads to mismanagement.

It is difficult to follow the reasoning on which this argument is based. Competition for those supplies with which we in this Association are concerned, viz., light and power, is, and must necessarily be, keen, which in itself is an incentive to economy.

The final argument used is that it is undesirable for any community to use its credit to cheapen those commodities which come within the sphere of municipal trading.

Where the rate-relief from trading equals the percentage already suggested, this argument may be dismissed.

As previously shown, if the total charges for loan interest and ratepayers' underwriting premium equal the charges which would have to be met by private enterprise, then municipal and private trading are on the same economic footing.

As a fair market price it seems impossible to justify charging consumers with more than the following, the total of which would probably equal, if not exceed, the price which would satisfy joint-stock companies working under leases from local authorities.

(*a*) Production, distribution and management costs.

(*b*) Debt redemption charges, supplementing these where necessary to make them equivalent to true depreciation.

(*c*) Interest charges.

(*d*) Underwriting charges (relief of rates) at 1 to 1¼ per cent.

Presumably the keenest advocates of rate-relief would not urge that consumers should be worse off under municipal than under private trading.

If this were the case, municipalities would certainly be unable to resist the encroachments of the large power companies, as they have had to do from time to time.

The recent declarations of Parliament are of great interest, and as the decisions of the two Houses are opposed to what may be termed the prevailing practice, they afford some hope that the permissive powers conferred upon local authorities by Sec. 7 of the Electric Lighting (Clauses) Act, 1899, may at no very distant date be reviewed and a statutory limitation of profits be imposed.

In the case of the Salford Corporation Bill of 1909, the House of Lords' Committee proposed to limit the application of gas profits for rate relief to 1 per cent. on the outstanding mortgage debt. The Bill was withdrawn, and now the outside districts have agreed, subject to the approval of the L.G.B., that the profits to be used for rate-relief should be limited to £10,000 per annum, instead of between £5,000 and £6,000 under the House of Lords' decision, and instead of £20,000 as claimed by Salford.

The next example is that of the Glasgow Bill before the House of Commons' Committee at a later date, when the Committee refused to recognise the right and prohibited any profit being applied to rate-relief, thus keeping in line with the general Scotch law regarding gas and other undertakings.

A further example, and one possibly more important still, as indicating the L.G.B.'s present attitude, is the Potteries Federation Act, under which no trading profits are to be devoted to rate-relief.

As far as the assets of any form of municipal enterprise are concerned, clearly the ratepayers' risk, whatever it may be, can only apply to the portion as yet unliquidated by the operations of the sinking fund, and the measure of benefit to be returned must be determined on the basis of the outstanding mortgage debt.

Economists in general do not regard municipal electric and gas supplies as fit subjects for any beyond the slightest taxation. Obviously there is no justification for indirect taxation upon one part of the community as a means of affording relief to the direct rating of the whole community.

Both the *Municipal Journal* and *The Accountant* observe:—

"Corporations which insist upon reducing rates out of profits prevent the focusing of public attention upon the rapidly rising general rates and to the extent to which this is done Imperial contributions are withheld and the reform of local taxation delayed."

It is worth asking what is the main force compelling local authorities to take up this attitude towards municipal trading.

Apparently the answer is to be found in the necessity for meeting the cost of ever-increasing duties imposed on them by Parliament without a corresponding increase of Imperial contributions.

The results of establishing a rational system of rate-aid would clearly be far-reaching.

Trading Committees would be relieved from the present haphazard control which is regulated by local exigencies and considerations external to the real question. They would further be under little temptation to neglect the provision of proper reserve and renewals funds, and for which neglect the author considers the present practices are largely accountable.

The author would here emphasise the invaluable, though indirect, benefits afforded to the ratepayers and citizens generally by a progressive policy of catering for power loads at low rates, consistent with the financial stability of the undertakings.

If large grants in aid are to be made in the future it will be practically impossible for local authorities to supply current for power purposes at prices which will command business, in which event the case for the municipality when threatened by power company legislation is thereby so much the more weakened.

Digressing for a moment, it is worth noting that in not a few local authorities are to be found those who, in addition to advocating substantial rate-aid, urge that the proper policy is not only to render their undertaking free from all debt in the first cycle of the working "life" of the undertaking, but also to provide moneys so as to present their successors with entirely new assets to begin another cycle.

As Parliament has intimated its preparedness to grant reborrowings for assets when worn out, there is surely no need to handicap the present development of electricity undertakings for the financial benefit of posterity.

What, however, is not equitable on the large scale may be welcomed in a small way. It is all a matter of degree. On this score, then, the action of the Local Government Board in recent years in advocating or compelling the purchase of services, meters, instruments, tools, spare parts, &c., out of revenue, instead of raising loan moneys therefor, may be welcomed. The author considers this is in the direct interests of supply undertakings, and in the absence of other checks helps to prevent the undue burdening of trading departments for rate aid.

Returning to the author's main theme, he endorses the suggestion made in various quarters that the matter is worthy of consideration at the hands of a Royal Commission. Alternatively he would ask why should not the Government refer it to the Special Committee now deliberating upon the Relation and Incidence of Imperial and Local Taxation.

As the question is one vitally affecting the development of the electrical industry, the author trusts that both the I.M.E.A. and I.E.E. will take up the idea.

ALD. BRUCE (Sunderland), while agreeing as to the policy of reducing the price to the consumer before subsidising the rates from the surplus profits, did not agree that Parliament should limit in any way rate contributions. In his opinion Parliament already dominated the profits made by municipalities, and if further legislative restrictions were introduced, there would be little control left at all to the municipality. He disputed the version of the Salford gas settlement given in the paper, which was finally arranged by mutual agreement, and argued that the present L.G.B. regulations safeguarded future generations, who would unquestionably be much better off than the present one. When an undertaking found itself with a large surplus it should revise its tariff and ensure that it did not occur a second year. In conclusion, he urged that the electrical engineer and his committee were competent to influence the Council, without Parliamentry control.

BAILIE SMITH (Glasgow), after pointing out the difference between tramway and gas or electricity undertakings, said in the latter case the tariff should be fixed from the balance of the previous year's working. If prices were inflated to produce rate contributions, it would in effect penalise the electricity users as compared with the less enterprising ratepayer who stuck to his smoky chimneys.

BAILIE STEVENSON (Edinburgh), in an admirable speech, said he was altogether opposed to the policy of relieving the general ratepayer at the expense of the electricity consumer. In Edinburgh during the last eight years, the electricity department had contributed £49,000 to the relief of the rates, which it had been repeatedly urged should be placed to reserve. But the temptation to the Council to appropriate it had always been too strong, and as long as the option existed, the policy of appropration would continue. This was unfair to the electrical undertaking, particularly because the Edinburgh and Leith gas undertaking had no power to subsidise the rates, and thus were able to compete unfairly. The Edinburgh reserve fund was up to the statutory limit of 10 per cent., but it was desired to provide a depreciation fund in addition to meet possible obsolescence—a policy which Ald. Bruce had criticised. In regard to the question of tariffs, they in Edinburgh had estimated for a surplus of only £400 on a revenue of nearly £140,000, on the principle of the prayer "lead us not into temptation, &c.," the temptation, of course, being the surplus, which it was always desired to acquire for the rates. He thought there should be unanimity in asking Parliament to take that temptation away, even if the limit were not fixed.

MR. A. E. SEATON, who posed as a Manchester ratepayer of some years' standing, jocularly drew attention to the peculiarities of civic promises in October, from all of which he gathered that the race of Ananias was not yet extinct.

ALD. SMITH (Liverpool) urged the broader view of responsibility to the municipality; the latter had a right to deal with its own funds in its own way. The ratepayer had a right to the surplus as a guarantor, who would be called on in case some catastrophe happened to the undertaking.

COUNCILLOR LEESE (Stoke-on-Trent) agreed with the author that a limit should be set to rate appropriation; the reference to the position in the Federation Act was, however, rather misleading.

MR. CAMPBELL, Brighton, suggested that it might be of more benefit to the community at large to reduce the price of electrical energy than to reduce the rates by a small amount. Parliament should be allowed to step in to safeguard the consumer, because the Corporation was in the position of a monopolist in electricity supply, and could adopt the same methods as a private monopoly.

BAILIE WILLOCK (Glasgow) also agreed that the best policy was to reduce the price of electricity rather than contribute to general rate aid.

MR. S. L. PEARCE, in replying, said he was surprised that Parliamentary action should be deprecated. He didn't agree that the Council had a right to take, say, 4 or 5 per cent. or that it should receive nothing; he suggested a middle course. The Parliamentary safeguard was wanted because electricity committees were absolutely powerless to sway the councils. The tendency of legislation was in the direction of restricting rate aid from profits, and he urged the absolute necessity of supplementing sinking fund contributions from a reserve fund where assets would not last their stated life.

Organisation in Electrical Undertakings.

A PAPER on this subject was contributed by Mr. C. M. Shaw, chief electrical engineer, Worcester, who takes the case of what is apparently a very large undertaking, and outlines by the aid of a skeleton chart the sub-division of duties among the staff. He urges that, subject to the Electricity Committee, the chief engineer should be responsible for the entire control of the undertaking, through the various departmental heads.

The first division is into engineering, clerical and commercial departments; the former covers all engineering work proper, the duties being divided under electrical, steam and mechanical engineers, distributing assistant (sub-station), mains engineer, testing (under chief assistant), chief draughtsman and chief inspector of street lighting, with further sub-division under each of them.

Mr. Shaw also adds a load dispatcher to be responsible for the control of current between the generating station and the consumer. Under the clerical department, the duties are principally divided between a private secretary, chief works clerk, accountant and their assistants.

The commercial department devotes itself to sales and publicity work, with a manager, under whom are advisory experts for the different classes of work undertaken, "business-getters," a correspondence department, showroom and construction department. The author outlines the duties of the various departments, and refers to the apparently harmonious co-operation of the central station and contractor in America, even though the former run wiring departments and sell consuming apparatus.

He points out, however, that the wiring departments confine themselves to large work or work which the contractor neglects, such as the smallest consumers and maintenance work.

We may mention that the relations between the central station and contractor in the States were discussed in connection with the report on residence business at the recent annual convention of the National Electric Light Association, and that it was agreed to appoint a committee to devise means of co-operation with contractors, architects, manufacturers, &c., a proceeding which somewhat qualifies Mr. Shaw's statement.

MR. C. E. C. SHAWFIELD (Wolverhampton), who opened this discussion, suggested that the author had evidently prepared for one of the national power houses mentioned in the presidential address, judging by his genealogical tree—at any rate, it was a station larger than he knew of, and was generally outside the scope of the average electricity undertaking in this country. The speaker then outlined a system applicable to the average sized plant, dividing the work up under generation, distribution and accountancy. Under the first heading, there would be responsible heads of the boiler house, engine room and for maintenance, while under distribution would be included responsibility for the current from the station to the consumer. This section of the work would cover publicity, mains work and current consuming devices, but more particularly the latter. As regards accountancy, it was absolutely essential that the engineer should be responsible for the allocation of expenditure, and that the electricity department should have charge of its accounts; the accountant should be the auditor to certify the accuracy of the figures.

MR. HARRY RICHARDSON (Dundee) reminded the author that the object of all organisation was simplification, and the scheme was not, perhaps, so simple as might be. It required a higher order of business ability to run an electricity undertaking than to run a tramway, which was practically a monopoly.

MR. J. E. EDGCOME (Kingston-on-Thames) regretted that so large an undertaking had been dealt with, but its size was not mentioned, although the chart mentioned about a hundred heads of departments. He doubted the wisdom of accepting the lowest tender just because it was the lowest one.

Several Councillor members also took part in the discussion, to which MR. SHAW briefly replied, pointing out that the paper had been prepared in a short time, and that it was originally intended to include the small station in its scope.

D

Pressure Regulators.

By S. J. WATSON, Chief Electrical Engineer, Bury.

(*Abstract of introductory remarks*).

IN discussing the question of pressure regulators, it may be as well to eliminate any reference to automatic regulation which may be incorporated in the design of generating machinery. A compound winding may be termed an automatic regulator, and has been found quite suitable for special cases, but impracticable in its application for general supply purposes. The following remarks will, therefore, have reference to regulators which may be provided as a separate piece of apparatus to the machine or machines which are to be regulated.

It may be noted, in passing, that close regulation on a generator, however provided, has a certain market price. Such being the case, it appears not unlikely that, as automatic regulating devices become still further improved and adopted as standard practice, designers may be allowed to attach less importance to regulation, and by so doing, improve the design in other directions, and at the same time effect an economy in materials and in cost.

Automatic regulators have been designed principally with the object of maintaining a constant pressure on the bus-bars at the generating station, or sub-station, or even to produce a compounding effect, so that the bus-bar pressure may be automatically varied to suit the load. They may also be used to maintain a constant speed on direct-current motors, which have to deal with large and frequent fluctuations of load. There exists, however, a much wider field for the application of such appliances. For instance, it is usual to connect up all feeders to a common bus-bar, but feeders are usually of different length, and adjustment of the pressure on each individual feeder may be necessary, owing to variations in the locality of the load, or to changes in the power-factor, during different periods of the 24 hours. The ideal place for the regulator would be the consumer's premises, or even on each large consuming device connected to the system, as, however constant the pressure may be maintained at the bus-bars, or at the feeder points, a certain amount of disturbance to the pressure will occur on the distributing system, through the switching on and off of large individual appliances.

It is, perhaps, well to bear in mind the fact that, although voltage regulation is of the greatest importance in its relation to a direct-current supply, both for lighting and power, and also for alternating-current lighting, the development during the past ten years of alternating-current motors for power purposes necessitates a constant motor speed for many industries, and this can only be obtained by maintaining a constant speed on the prime movers. Where the fluctuations of load are large, it may be necessary to apply the principle of the pressure regulator to the governor of the engine or turbine, so as to ensure, not only a constant voltage for lighting, but also an absolutely constant frequency for power.

Probably the best regulator for a direct-current supply system is a storage battery of large capacity, with an automatic booster or regulating switch controlled by the bus-bar pressure. In addition to acting as a regulator, the battery would be found exceedingly useful at the time of a breakdown or other emergency.

The principal requirement of an automatic regulating device is, of course, that it should be, at all times, and under all conditions, completely automatic in its action. Unfortunately, few automatic devices are free from trouble in this direction.

The majority of the instruments used for the purpose of controlling the pressure of supply, consist, either of a movable iron core, inserted in a shunt coil, or of a movable shunt coil, which can rotate between the poles of a permanent magnet. The shunt coils in both cases being excited from the bus-bars. If the bus-bar pressure falls, the movement of the core or the shunt coil is in one direction, and if the bus-bar pressure rises, the movement is in the other direction.

With ordinary changes of pressure the movement produced, and the power exerted, is quite small; it is, therefore, necessary to magnify the movement or to use relays, in order to obtain a sufficient range of regulation, and the mechanical power required to operate an auxiliary regulating device.

By means of the auxiliary device, which may consist of a small motor or solenoids, regulation is obtained by: (1) Moving the switch which varies the resistance in circuit with the field-winding of the generator; (2) varying the field of a small, separate, exciter supplying the field of the generator; or (3) diverting more or less of the field current of the generator.

When a number of generators are run in parallel, a regulator may be used, controlling them all, in which case any variation in load is distributed equally over all the plant, or with one generator only, which will then deal with the fluctuations and allow the other plant to run at constant load.

Regulators are usually provided with hand adjustment to enable the bus-bar pressure to be varied, when necessary, to suit the load conditions.

Quickness of operation and closeness of control must always be special features in automatic regulating devices, particularly when a mixed system is supplied from a common bus-bar; but for lighting purposes only extreme sensitiveness in the instrument is not so essential. A variation in pressure of 1½ per cent. up or down over a period, say, of 20 seconds, would in such a case, give almost as good results in practice as absolutely instantaneous operation, but where lighting is supplied for general purposes from a power main dealing with a large and fluctuating load, or from a railway supply, a similar regulator would be almost useless.

It is difficult to express the value between a system where the pressure regulation is good and where it is bad: but that it must have a very real value from the user's point of view, is undoubted.

MR. FRANK AYTON (Ipswich) commented on the necessity of automatic regulation where both power and lighting were supplied from the same mains. The introduction of some large motors at Ipswich had led him to investigate the matter, and after inspecting the excellent working of the Taylor-Scotson apparatus at Sunderland, he had decided to install two similar regulators, one between the outers and the other in the middle wire where the worst out-of-balance occurred.

MR. H. M. TAYLOR (Middlesbrough) spoke at length on the subject of automatic regulation, pointing out that the great trouble in D.C. supply was voltage variation in the feeders, not in the bus-bars, and that, no doubt, a similar state of things would occur with A.C. feeders as they got loaded up. He described in detail the method of using regulators in Middlesbrough for keeping a constant pressure at any desired feeding point. On most D.C. systems the out-of-balance variation was more serious than the voltage variation in the outers, and this called for the use of a series booster in the neutral. Simultaneous regulation of all generators should be provided, and the regulating apparatus should be applicable to any kind of plant. Mr. Ayton's arrangement provided for regulating the neutral at a different point to the outers, and a pilot board should be used to allow for regulating any required point.

MR. A. H. WATSON (B.T.-H. Co.) described at length the Tirrill regulator; he thought the Thury device was admittedly slow in action, and that the Brown-Boveri apparatus was an improvement on the rheostat arrangement. The checking action of the Tirrill regulator was, he thought, preferable to the pendulum control adopted in the Taylor device, and it seemed that the failure of the latter would upset the excitation unless the booster were hand regulated by the central zero voltmeter. It was a coincidence that one of the first stations to use a Tirrill regulator was Harrogate, but generally it was surprising that automatic regulation was not more often adopted by electric lighting stations.

MR. C. E. C. SHAWFIELD (Wolverhampton) described how the synchronism of rolling-mill loads in his undertaking sometimes gave 50 to 75 per cent. overloads on the running plant and made automatic regulation imperative. He had used the Tirrill regulator for some time, and its defect was that, without warning, the regulating contacts would remain either in the open or closed position, sending up the bus-bar pressure to, say, 7,000 volts, with damage to lamps, or dropping it to, say, 3,000 volts, which meant practically a shut down. Careful attention would not prevent this occurring, and an abnormal peak was certain to bring it on. As a result of this, he had installed a Brown-Boveri regulator, and found that, while it controlled within 1½ per cent. (as compared with under 1 per cent. in the case of the Tirrill) it was was quite reliable and free from the defects of the latter.

MR. J. E. EDGCOME (Kingston-on-Thames) mentioned the excellent regulation obtained at Kingston, where a large motor had upset the 2,000-volt supply during the day, and the Tirrill regulator had been introduced to take care of this. He was now faced with a more difficult problem of providing a regulator which would deal satisfactorily with the load when two direct driven exciters were installed to run in parallel with three steam driven exciters. He thought both nickel and silver contacts were employed in the Tirrill contacts which had not given much trouble.

MR. A. H. WATSON here said that silver relay contracts were usually supplied, but they were not so satisfactory on low voltage exciters as platinum contacts, and Mr. Shawfield added that he had used both silver and platinum alloy contacts and found only slight improvement with the latter.

MR. A. J. BECKETT (Bridlington) mentioned the effect of the illumination load (20 per cent. of the total) which came on in the evening at his town, and had been met by installing a Tirrill regulator; he was also installing a C.M.B. balancer to deal with the balance in the town.

MR. W. J. BACHE (Cheltenham) mentioned having installed a Taylor-Scotson regulator, which was necessitated by having recently added a traction supply; he regulated on a feeding point 2,000 yards away.

MR. C. TURNBULL (Tynemouth) said he had considered both the Tirrill and Taylor-Scotson devices, but not being able to afford them had borrowed the design of an arrangement made and used by Mr. Watson, at Bury, and having copied this for himself, found it quite satisfactory in use, although not so good as the previously-mentioned devices. Electric cooking would not be satisfactory on a three-wire system on account of pressure variation, even though the feeding point was regulated, and he suggested as a solution distribution from A.C. sub-stations equipped with automatic regulators.

MR. A. C. CRAMB (Croydon) agreed that so long as the Tirrill apparatus was not subjected to severe use it behaved satisfactorily. The Tirrill apparatus, however, had to be added for each machine with increasing expense, while one Taylor-Scotson apparatus would provide for all of them.

MR. S. J. WATSON, in replying, alluded to the necessity of arranging that voltage regulating apparatus should automatically cut itself out of action if anything went wrong.

Baildon Electric Lighting.—The U.D.C. has passed a statutory resolution to apply to the B.O.T. for a prov. order for electricity supply.

COMBINED SWITCH AND PLUG CONNECTORS.

BY DONALD SMEATON MUNRO.

THE 1911 Wiring Rules of the Institution of Electrical Engineers and the new Home Office Regulations both dwell at some length on the importance of controlling flexible cords by switches at the supply end.

In many towns it has always been the practice to fit a controlling switch for every wall socket, or small group of sockets, and in other districts the precaution has been almost universally ignored.

It is found in practice that the use by the consumer of such separate switches is neglected, very often because they are placed at some little distance from the socket and plug which they control. Even when they are fitted close together, say, on the same block if switch and socket are of raised pattern, or in the same box if they are of sunk flush pattern, the two separate accessories are somewhat clumsy and expensive to fit. Fig. 1 shows a common arrangement, and even when the socket is of the smallest size, the whole fixture with its containing box is large and awkward to fix.

There are now on the market several forms of combined switches and sockets. Unfortunately, they are mostly applicable to fitting above the wall or baseboard surface. The requirements of a good switch and socket are difficult to combine in a compact form. The moving parts are not conveniently accessible for repair. Some of these combined

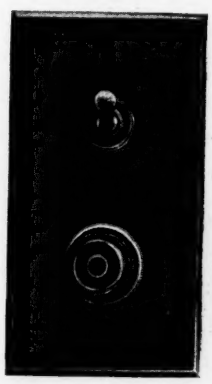


FIG. 1.

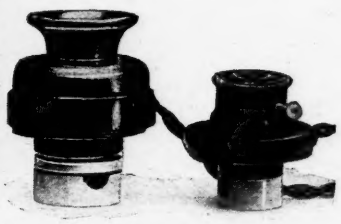


FIG. 2.

patterns are needlessly complicated by arrangements whereby the switch is "off" before the plug can be withdrawn. This quality is, perhaps, desirable in an explosive atmosphere, but for ordinary use it is unnecessary, as even should the switch be left accidentally "on" when the plug is pulled out, the break caused by the prongs is a double-pole one, and the spark is therefore very slight.

In actual use the flexible cord is apt to get broken or pulled out before the user notices that there is a trick about the arrangement. Some forms of combined sockets and switches put an unsafe stress on the contact pins, and are so arranged that the pins enter by the side of the plug instead of the front, so that the plug is liable to fall out and the flexible is apt to be bent sharply at right angles.

There is a further drawback that where ordinary sockets are already fitted switches cannot now be added, to comply with the Insurance and other rules, without changing the whole appliance and probably also injuring the surrounding decorations. These switch sockets are, therefore, but sparingly used.

There are some advantages, the writer considers, in combining the switch with the movable plug instead of with the fixed socket as has hitherto been the practice. Two forms of this arrangement for which patent rights have been applied for are illustrated in fig. 2.

In the larger size a flat pattern tumbler switch is chosen. Instead of having two holes for the hard wires to enter, it carries instead two stout split contact-pins projecting behind, of a size and position to fit any desired make of plug socket.

Grooves for the flexible wires are provided in the base, as is also an axial exit passage, so that the twin or triple flexible may enter and be connected to appropriate terminal sockets. The switch is thereby converted to serve also the purposes of a plug from which the flexible conductors emerge downwards, leaving the switch "dolly" and gear unaltered.

The base of the switch makes an effective hand guard, and a grip for the fingers is formed by fitting a shallow trumpet-shaped piece on the centre screw of the switch, as shown, or the china base or spun cover may be suitably shaped to form a convenient handle.

In places where it is desired to have a very small plug, the miniature piston type of switch as shown is applied, and this is quite neat and effective for single lamp control.

BULK SUPPLY IN DURBAN.

[FROM OUR SPECIAL CORRESPONDENT AT DURBAN.]

PREPARATIONS have been in hand for some time at the Durban Corporation Electric Power Station for the supply of electric power in bulk to the Government of the Union of South Africa for the railway and harbour requirements in Durban and district, and on Sunday, June 2nd, the change-over was satisfactorily effected.

This means the shutting down of the Government power station, which is only a few years old and was described on page 299 of our issue for August 21st, 1908.

The building now becomes one of the sub-stations at which point the bulk of the supply is taken from three Corporation mains at 6,600 volts three-phase 50 periods.

The cables were supplied by Messrs. Callender's Co., and are of three-core ·1 sq. in., paper-insulated, with copper earth shield, which, after laying and jointing, were tested to 10,000 volts.

At the sub-station there are five Reyrolle standard three-phase switch panels, for controlling the various incoming and outgoing cables; the outgoing cables are two in number and they were laid by the Government at the time the plant was put in; these also are ·1 sq. in. three-core, and are for supplying power for the Point and Bluff.

At the Point section, current is taken at 6,600 volts three-phase and also 500 volts D.C., the conversion from three-phase to D.C. being effected by the previously installed 300-KW. La Cour converters, now taken over by the Corporation.

At the Bluff section, current is taken at 6,600 volts three-phase into the Government sub-station as before, but in this case the Government do the converting.

Under the agreement between the Corporation and the Government, the former takes over certain of the plant, for which payment will be made to the extent of about £26,000, while the Corporation itself has entailed an expenditure of about £50,000 for the extension of plant to meet this bulk supply, and also for future requirements in Durban and district. Among manufacturers and other users of machinery, the plant taken over by the Corporation from the Government is as follows:—Two 750-KW. Willans-Parsons turbines, with three-phase 6,600 volts 50 periods Bruce-Peebles generators; two surface condensing plants and circulating pumps; two 300-KW. La Cour converters; and cables between works and Bluff.

The new plant installed by the Corporation is as follows:—Two 2,000-KW. Parsons turbos three-phase 6,600 volts 50 periods; one barometric condenser (Mirrlees-Watson); two B. & W. boilers, 28,000 lb. evaporation, with chain-grate stokers; extension of cooling tower and pumping plant; three-phase switch panels.

The agreement is for 15 years, and the very low price of $\frac{3}{4}$d. per unit has been fixed upon with a minimum of $2\frac{1}{4}$ million units per annum, and it may be of interest to mention that this price is far away the lowest rate for bulk supply in South Africa, as will be seen by comparison with the other Government bulk supplies, as follows:—

Durban	·75d.	per unit,	2¼ million	units	minimum
Pietermaritzburg	1·25d.	,,	750,000	,,	,,
Cape Town ...	1·5d.	,,	1¼ million	,,	,,
Port Elizabeth ...	2d.	,,	150,000	,,	,,
East London ...	3d.	,,	125,000	,,	,,

The average day load taken by the Government is about 1,200 KW., and at night 300 KW. This will very materially help to flatten out the peak and tend to more economical running, and now that the Corporation are in a position to meet practically all demands for power, it is expected that other consumers will follow on; in fact, already one brick company is taking three-phase current for two 300-H.P. motors at a distance of five miles from the centre of the town. It might be of interest to mention that this new load will bring the output of units sold from the Corporation power station to nearly 12 million units per annum, and the next municipal year should see this figure reached if not exceeded. Considering that the population of the town is about 34,000 whites and the same number coloured, the average consumption per head of population far exceeds that which obtains in most English towns.

Touching briefly on the financial side of the undertaking, considering the output the capital expenditure of £350,000 cannot be considered excessive.

The cost of production is also a creditable figure for a Colonial town where wages and coal are high, being ·9d. per unit sold, excluding capital charges.

It is hoped later on to give a full account of the extensions at Durban, as since our description of the plant when first laid down in 1900 many additions have been made and plant has been replaced, causing quite a transformation in the power station.

NOTES FROM CANADA.

[FROM OUR SPECIAL CORRESPONDENT.]

An event of importance in the Canadian electrical world is the Convention of the Canadian Electrical Association, which meets this year at Ottawa during the current month. The programme includes the presentation of reports by various sectional committees, visits to places of interest, and a number of papers will be read.

Work is now in progress on a civic hydro-electric plant for the city of Prince Albert, Saskatchewan. The water power available is some 12,000 H.P. under a head of 30 ft. The transmission line voltage is to be 35,000, stepped down to 23,000 in the city. Altogether the scheme will cost nearly a million dollars.

The double tracking of the C.P.R. throughout the British Columbia section is contemplated, the probable cost being about £1,250,000; such an undertaking, it is reported, would not have been thought of for many years to come, but for the fact that the Panama Canal is approaching completion. Activity is also apparent, for the same reason, on other trans-Continental lines.

A Toronto morning paper points out that the financing of the great works in hand, or about to be undertaken, by these railway companies has been rendered much easier owing to the beneficial effects which it is recognised the canal will have on the trade of British Columbia. The following sentence from an editorial in the paper referred to is worth quoting:—"It will be the policy of that Government" (*i.e.*, the Provincial Government of British Columbia) "to keep railway freights low enough to favour British Columbia ports for Western Canada's incoming and outgoing merchandise. British manufactured goods will be shipped to such centres as Regina and Edmonton by way of the Panama Canal and the ports of Vancouver and Prince Rupert. The lower through freight rates will give British manufacturers a new advantage in the competition for the market of Western Canada."

Reference was made recently in these notes to the fact that a deputation from New York State was investigating the operations of the Hydro-Electric Power Commission of Ontario. It is now reported that this Commission may be the pattern for similar public enterprises in the States. The Association of Mayors of the State referred to has endorsed the Ontario policy, and has asked the State Legislature to work on similar lines. The Conservation Commission of Oregon is also considering how to promote a similar undertaking.

The event of the week in Toronto has been the visit of the British manufacturers who arrived in Canada recently. Although the object is to, if possible, enter the Canadian market, thus constituting themselves competitors of the Canadian manufacturers already on the spot, the latter have extended every courtesy to the visitors. Toronto itself gave them a civic welcome, and they were invited to locate factories in the "Queen City," and were also informed that the city would do everything in its power to assist them by supplying any desired information and giving them every facility it could. Everywhere they are being received with open arms.

The visitors, although they have as yet seen only Eastern Canada, are greatly impressed with her resources and the future possibilities of trade. The representatives of some firms have already decided to recommend that a factory or works should be established here, while others are evidently prepared to consider the matter seriously.

In some quarters it would appear that present practice and fashion, which are mainly based on American ideals, militate against the British manufacturer; these factors have to be reckoned with, as the average Canadian is very conservative, and is little or no more inclined to depart from what he has been used to all his life than the average Britisher, who is supposed to have a special reputation of his own on this point.

The repeated strikes in the British labour world are going to be a very serious thing for home firms; already one hears that over here people wonder whether it will be worth while to send an order to Great Britain; they ask themselves when the goods are likely to be delivered should another strike occur. What a pity that the British workman is so blind to this aspect of affairs!

The Hydro-Electric Power Commission of Ontario is still, like a well-known whisky, "forging ahead"; every month fresh applications for power are being made by towns and villages. Starting with 13 municipalities taking power, some 18 months ago, there are now 29 being supplied, and many others anxious to participate in the scheme.

Rules, having for their object the minimising of the life and fire risks connected with electrical work, are now being drafted, and a chief inspector has been appointed to organise inspection work in all the municipalities throughout the province.

The work of this department, if efficiently carried out, should prove a boon in this country where, from an electrical standpoint, life is regarded far too cheaply. One is glad to find, for example, that the Commission has very wide powers in relation to overhead wires, as it can order all such as are considered to be a menace to the public safety to be placed underground. One has only to see the wires in any large town here to realise that the linemen take their lives in their hands whenever they climb a pole; accidents and death to such men are of very frequent occurrence.

The Commission is also going to erect at once a large building to serve as a testing laboratory and stores, for supplies which will be bought in bulk by the Commission and retailed to the municipalities.

Next week a demonstration is to be given for the benefit of the farmers in a certain district, to show them the multiplicity of uses to which electricity may be applied on a farm.

It has been decided to spend £35,000 on electric light and power machinery, and £16,000 on extensions to the distribution system at Saskatoon, Saskatchewan.

The city of Edmonton, Alberta, has recently placed orders for a 2,000-KW. turbo-alternator, a 750-KW. D.C. generator direct-coupled to a steam engine, and a 425-H.P. three-phase motor.

So far as the writer is able to judge at present, the opportunity of the British manufacturer lies in motors of fair size, generators, and switchboards, rather than in accessories, small motors, &c., though there are possibilities even in the latter items. Unfortunately, it is doubtful if home firms will ever be able to enter the field for apparatus,

switchgear, &c., for the very high voltages now coming into use on this side of the Atlantic, owing to lack of opportunity of gaining practical experience with pressures of 100,000 volts and upwards.

A field which is likely to develop over here is the use of sub-stations with transformers and the necessary switchgear put out in the open air and merely fenced round to prevent people from getting shocks, thus saving the cost of a building where this is not essential to the satisfactory operation of the sub-station. Several such stations are in operation in the United States at the present time.

512, Continental Life Building, Toronto.

CORRESPONDENCE.

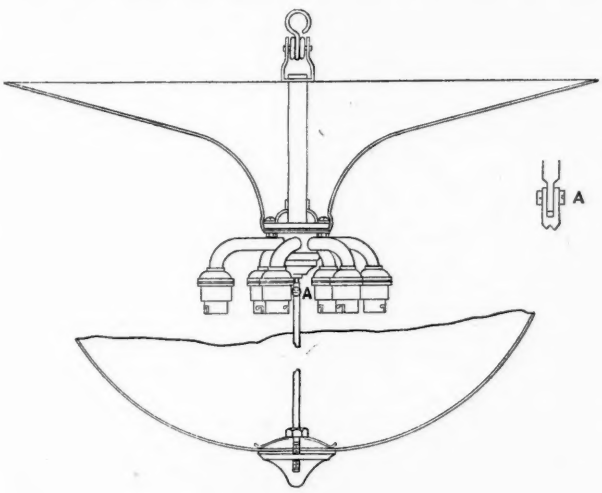
Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Indirect Lighting.

The article and correspondence which have appeared in your issues of June 14th-28th are of considerable interest at present, as this system of lighting is now more widely adopted.

Having been one of the first firms to introduce this system for metal-filament lamps, we venture to suggest that the best type of fitting is one designed to combine a certain proportion of transmittted light with reflected or indirect light.

The quality of the glass in the opalescent shade used in such fittings is of the greatest importance in securing efficiency and adequate diffusion. It must not be too dense, so as to



absorb much light, but still dense enough to screen the lamps from view and give a soft, diffused light, without any glare. The disadvantages of the latter have been fully pointed out by "Whistlefield."

When dealing with candle-powers of 300 to 600, as now in demand, it is essential to arrange the lamps in a vertical group of three to six.

In our experience it is impossible to rely on ceilings and walls for efficient reflection in all cases. They can be designed and decorated to give an ideal system of indirect lighting, but in practice they are often of colours which absorb light instead of reflecting it.

By the design adopted in the "Adnil" fittings (shown herewith), the illumination is made largely independent of the ceiling and walls, a large conical reflector of diameter 16 to 21½ in. being permanently used. This acts in conjunction with the opalescent shade referred to, and the required foot-candle illumination can be arranged to be uniform over large spaces with maximum efficiency.

A central indirect light fitting, with lamps screened by an opalescent shade, as used in the Adnil system, is preferred by many on account of its being more sightly in appearance than a metal lower shade, as used by some manufacturers for purely indirect lighting.

The various arrangements proposed by your correspondents are ingenious adaptations of standard material, but do not provide for high candle-power so as to compete with indirect-light arcs, and for such cases would apparently be more costly than special fittings as above.

The "Adnil" fittings have now been installed in many of the largest works in the country, and to suit the most varied requirements of illumination.

Adnil Electric Co., Ltd.,
S. G. LEACH, *Manager.*

London, E.C., *July 2nd*, 1912.

Publicity.

We have read with interest the article under the heading "Some Second Thoughts on Publicity," which appears in your issue dated April 26th, and, bearing on this subject, it may interest you to know what has been done in the direction of publicity by the Sydney City Council, at the instigation of Mr. H. R. Forbes-Mackay, the chief electrical engineer, in order to popularise and extend the use of electricity along the routes of new mains. This takes the form of a 26-page illustrated pamphlet, in which a great deal of useful information in respect to the relative costs of driving machinery by different methods is set out in tabular form by Mr. G. A. Julius B.Sc., M.E., who also contributes the introductory matter.

The managers of several local factories operating their plant by means of electricity supplied through the Council's mains were interviewed, and their experiences are given, together with photographs of electrically operated machinery.

Works inspected and reported on include those of builders, box-makers, timber yard, cordial factory, flour-milling company, a large drapery establishment, printing works, &c.

Under separate cover we have pleasure in sending you a copy of "Power," which is the title of the pamphlet referred to. This is published by Mr. Critchley Parker, of the *Australian Mining Standard, Engineering and Electrical Record*, for the Sydney City Council, and is intended for free distribution within the area covered by the Council's mains.

Critchley Parker.

Melbourne, *May 29th*, 1912.

An Objectionable Clause.

From "Fairplay's" first letter I gathered he wanted the contractors to combine to except the objectionable clause from their tender. By so doing (if the clause was knocked out) it would leave the contractors in the position that is now held by the Trade Unions Codlin or Short. That is how it appeared, I feel sure, to the majority of your readers.

"Fairplay" now comes out as an upholder of Trade Union rates and conditions, and admits that all labour is underpaid. Then, according to "Fairplay," if wages rise the trade of the country goes abroad, &c. What a blessing it would be if no wages were paid at all, then, evidently, this country, or any other for that matter, would capture all the work of the world! Then we find, according to "Fairplay," that whenever, through the efforts of Trade Unions, wages have risen, unemployment has been more rife. In the same breath "Fairplay" tells us that "No thinking man would deny the good done by Trade Unions in the past in bettering the lot of the workers." Both statements cannot be right. Which is true?

"Fairplay" goes on to tell us we are petted and pampered; we have grown mighty in the land. Just so; that is the reason that one sees so many advertisements in the "Wanted" columns of the REVIEW. Then "Fairplay" goes on to tell the world that my organisation is weak. Possibly so, in London; but from the rush to join that has been going on recently, that statement will soon be a statement only. His next gem, "That the E.T.U. is one which *most* of the best men in the trade ignore," is false, and I challenge him to prove it in London even. I maintain that

the majority of the best men in the trade in London are now in the ranks of the Electrical Trades Union. A large number of our members at present do not consider it advisable to wear their hearts on their sleeve. It might mean the sack if some of their masters, fair contractors I think they are called, got to hear of it.

The last part of "Fairplay's" article is rare and refreshing. My followers, is fine, and although up to the present I have not been appointed "sole arbitrator," most workmen (and, I suppose, workmen, equally as much as contractors, have certain rights), would rather the E.T.U. be the judge than some contractors that we wot of. In reading the correspondence on this matter one of our members remarked, "'Fairplay' is clever; Mr. Collins is easy." I trust neither gentleman will take that as flattery or insult.

It is apparent to the merest outsider that Mr. Collins's tirade against Trade Unionism answers itself. I have re-read Mr. Collins's first letter, and it certainly is most convincing. I can quite understand his suggestion for the total abolition of anything, in any clause, appertaining in the slightest degree to Trade Unions. Yes, Mr. Collins, I should most certainly think it a crime if a contractor made a "mistake" in the rate of wages paid, the same sort of crime as if you discovered one of your workmen taking home a coil of wire by "mistake." Both are robbery, and the sentence should be the same in each case.

For the benefit of your readers generally, and Mr. Collins in particular, I should like it to be generally known that the Electrical Trades Union is not permeated with Socialistic rot, but is an organisation that is out to raise wages and better conditions for the men employed in our industry. I have just heard that this particular contract has been placed, and the objectionable clause remains; and I trust that the contractor will act up to the letter of his contract. Then there will be no friction between my society and himself. If, however, he attempts to "rob" his workmen, then it is within the bounds of possibility that one of the sole arbitrators may be

W. J. Webb.

London, S.W., *June 29th*, 1912.

THE NON-FERROUS METALS EXHIBITION.

Although the title of this Exhibition did not appeal very strongly to the electrical engineer, there were many exhibits of more or less direct interest to him. The Exhibition, however, fell very far short of what it might have been; it was largely confined to products, whereas there was great scope for the display of processes, in every stage from the reduction of the ore to the finished article, and it is to be regretted that the opportunity was not more fully utilised.

Amongst the exceptions to the foregoing remarks were the Rapid Magnetting Machine Co., Ltd., who exhibited several of their latest types of machines for removing magnetic particles from "non-ferrous" substances. The rotary machines have been described in our pages; they are intended for dealing with materials containing large quantities or large pieces of iron. A new type of separator has recently been introduced for cases where the percentage of iron is small, but must be completely removed. It consists essentially in a succession of iron bars fixed transversely in an inclined shaking trough, and partly covered with brass plates, which, however, allow the iron bars to form shallow steps: the material to be sorted is fed from a hopper over a shaker feed tray into the shoot, the inclination of which can be varied to suit the material. As the stuff slides slowly down the shoot, the iron bars, which are magnetised from below, arrest the magnetic particles, and these are pushed over the front of each step, clinging to the iron, while the non-magnetic material passes over the top of the step. As there are a great many bars, it is almost impossible for a particle of iron to escape contact with one or other of them, so that the iron is very thoroughly eliminated. The iron collected is discharged at intervals into a bucket by stopping the feed and switching-off the current, the operation taking only a few seconds. The machine exhibited can deal will 40 to 60 cwt. of brass turnings per day of 10 hours, with a current of 3 amperes at 110 volts.

Messrs. Thermit, Ltd., had a stand, at which they showed a variety of metals and alloys produced by the alumino-thermic process, which yields products uniform in quality, and absolutely free from carbon. They showed also a number of interesting welds effected by the Thermit process, cut in halves to show the completeness of the welds; broken cylinders, shafts, and other castings and forgings can be repaired by this means. The process of welding steel tram-rails was demonstrated by a miniature cinematograph, with a screen about 15 in. × 18 in., which formed a very effective and interesting exhibit. We understand that all such welding is done under the direct supervision of one of the company's permanent staff of welders. The company claim to be welding 90 per cent. of all tramway trackwork in this country, and recently, as the result of comparative tests, have secured the L.C.C. tramway welding contract, having already welded 20 miles of track for the Council.

Messrs. George Jones, Ltd., Birmingham, showed some electrically-driven rolling mills of substantial construction; Messrs. Dugdill's Patents, Failsworth, had a stand of their patent fittings; Messrs. James Booth & Co., Ltd., Birmingham, showed a great variety of sections of extruded brass and copper, including turbine blades and commutator segments, while the allied firm of Samuel Booth & Co. showed electric light fittings. The British Aluminium Co., Ltd., Messrs. H. Erhardt & Co. (tinfoil manufacturers), and Messrs. Locke, Lancaster, & W. W. & R. Johnson & Sons, Ltd. (lead and litharge merchants), showed their respective manufactures; Duralumin made a noteworthy exhibit at the stand of Messrs. Vickers, Ltd., and the Sulphalium Co. also had a stand of their products. Ribbon metals and strip solder were shown by the British Lead Co. Switch-plates were shown by Mr. James Smithies, of Wilmslow, and wire-drawing machines were in operation on the stand of Messrs. W. H. A. Robertson & Co., Ltd., Bedford. Copper and brass tubes and numerous other manufactured metals were well represented.

ELECTRICAL ACCIDENTS IN 1911.

The annual report of the Chief Inspector of Factories and Workshops to the Home Office, issued last week, contains the report of the electrical inspector, Mr. G. Scott Ram, which is given in abstract below:—

TABLE I.—Accidents at Electrical Generating Stations and Sub-stations in 1911.

The small figures relate to fatal accidents, and are included in the principal figures.

Description. (1)	Public supply stations and electric railways and tramways. (2)	Other stations. (3)
Non-electrical:—		
At engines, pumps and generators ...	18	4
At boilers and steam plant	39	6
At coal-handling plant	18[1]	3
Falls	76[5]	8[1]
Struck by falling bodies	28	—
Miscellaneous	91[1]	17
Total	270[7]	38[1]
Electrical:—		
At switchboards when engaged in ordinary routine work—mostly due to faulty design of apparatus or to mistakes on the part of the switchman.	12	5
Cleaning, repairing, &c., at "live" switchboards or other "live" conductors.	27[3]	2
Cleaning, repairing, or other handling of switchboards supposed to have been made "dead"—		
Skilled persons ...	3[1]	—
Unskilled persons ...	—	—
Adjusting brushes & cleaning commutators	9	3
Miscellaneous	12	1
Total	63[4]	11

The number of mechanical accidents is about the same as in the previous year, and calls for no special comment. The number of electrical accidents was somewhat greater—74 against 58 last year—the number of fatalities, 4, being the same. With few exceptions the causes of the accidents were similar to those which I have described in detail in former reports. In working on a dead portion of a high-tension switchboard, adequate screening of adjacent live conductors is not always provided. In one of these cases the man received a shock and severe burns from a 6,000-volt system. He was rendered insensible, but was brought round by artificial respiration, and was able to return to light work in about six weeks. In another similar case, the man was killed outright on a 20,000-volt system. Screens were actually provided in this case and were lying on the floor unused. The actual work in hand was upon some apparatus about 2 ft. or 3 ft. from the floor. There were live conductors above, about 8 ft. 6 in. from the floor. It was overlooked that in reinstating the apparatus a man might climb on to a part of it, and so be within reach of the live conductors.

Several accidents occurred in cleaning extra-high-tension switchboards. In one case—in a sub-station—a cell had been made dead and the door opened for cleaning. A second door was then opened before the conductors had been made dead. The cleaner went into the second chamber and received a shock between his hand and neck. A heavy short-circuit occurred, bringing out the circuit-breaker at the generating station. The man was badly burned and was rendered insensible, but was brought round by artificial respiration, and was able to return to work in a few weeks. In another

case, in a generating station, the switchboard was arranged in two sections so that either could at any time be made dead for cleaning or other work, but was not otherwise subdivided. There was an interconnecting switch at the end of one section, but not screened off. This switch could have been made dead by means of isolating switches in the gallery below, but this had not been done, and it was therefore live on one side. The man who was cleaning, who was also a switchboard attendant, touched this switch, and although severely injured by shock and burns, his right arm having to be amputated at the shoulder, he escaped with his life. In subsequent legal proceedings, the responsibility for the accident was held to lie with the injured man himself for going into the chamber while the interconnecting switch was alive. In another case, a man was cleaning insulators with exposed conductors at extra-high-pressure close by. He was severely injured, but not killed. In another, a sub-station attendant received a shock at extra-high pressure, apparently through his own fault in not making sure whether the current had been switched off at the generating station end of the line before starting to clean the apparatus. Another high-tension accident occurred to a man working in a switchboard cell, and appears to have been due to the stupidity of the man in charge in allowing the pressure to be turned on before the work was completed. In another case, a "competent" man was fixing a guard at some high-tension apparatus with wire. As might have been expected, the loose end made contact with a live conductor. In the second fatal case a competent and experienced man appears to have forgotten that the oil switch which he was examining was live, and touched one of the terminals. It is remarkable that of the above nine accidents on high-tension or extra-high-tension alternating systems, only two had fatal results.

Several accidents occurred through men making short circuits on direct-current medium-pressure systems. Some were due to the omission to take any kind of precautionary measures. Thus, ordinary engine room spanners were used in several cases to tighten up nuts at the backs of switchboards, no precautions by screening or otherwise being taken, the spanner being applied to a live nut on one pole, and bare bus-bars or other conductors on the other pole being only a short distance away—less than the length of the spanner. The extraordinary thing is that such things are done by switchboard attendants of experience. Much of the blame often, however, lies with the employers or their responsible engineer in not providing special insulated spanners or other forms of temporary protection in view of work on live conductors becoming necessary. In one case, two assistant engineers proceeded on the above lines to tighten up a live nut on one of the main connections behind the bus-bars at the back of the switchboard, and produced the inevitable short circuit. They were both burned, but not very badly. The short circuit apparently produced a surge with probably a big rise in the pressure on the breaking of the short-circuit current, with the result that a flash-over occurred at another part of the switchboard several feet away, at a place where the positive and negative conductors on a marble panel were barely 1 in. apart without any insulating division between. The normal difference of pressure between these conductors was 580 volts, and although this would be a long way below that necessary to start an arc between conductors in air, it might conceivably do so without difficulty if dirt or dust were allowed to accumulate on the surface of the marble. There is no doubt, however, that on the breaking of a very heavy current such as would be caused by a short circuit on a station switchboard with 2,000 or 3,000 KW. behind it and with no circuit-breakers on the generators, a very great momentary rise in pressure might occur. On 550-volt traction switchboards it has been proved that the operation of a feeder circuit-breaker on heavy overload may produce a momentary rise of pressure of over 10,000 volts. The design of the switchboard, with the main conductors placed so closely together, was obviously at fault, as even under normal conditions accidental short circuit might be readily brought about, and the mere cleaning of the surface of the marble between the conductors would be a hazardous undertaking. The above accident had a very unfortunate sequel a few hours later. The switchboord attendant noticed that at the place where the arcing-over had occurred, there was a slight discharge going on across the marble between the positive and negative conductors. This may have occurred through a film of copper having been deposited on the marble at the time of the flash-over. He reported the sparking to the station superintendent, and while the latter was looking at it, it again developed into a flash-over or short-circuit, with the result that the superintendent was so severely burned that he died within a few hours.

Under the next heading, the fatal accident occurred to an experienced man who was about to do some work in a cell of a single-phase high-tension switchboard. The system had one pole earthed, and the switchboard was a single-pole one. The cell contained an oil switch for a generator. The switch was connected directly, and not through isolating switches, to the ring bus-bars of the switchboard. The bus-bars were, however, provided with a number of disconnecting links in order that any circuit might be isolated by removing the link on each side of the point where it connected with the bus-bars. The man had removed the links on each side of the connection to the switch at which he was intending to work. Unfortunately the system of disconnecting links had not been adhered to when extensions had been made. A generator placed at a later date in another engine room had been connected to the same part of the bus-bars. The removal of the two disconnecting links did not, therefore, disconnect the second generator from the switch cell in question. This second generator happened to be at work, and although it was connected to the bus-bars through an oil switch, the man appeared to have forgotten the arrangement of the connections, and omitted to pull out the switch. He consequently opened the door of the switch cell of the first generator, thinking it was all dead, and received a fatal shock. The accident appears, therefore, to have been in part attributable to the connection of the subsequent generator with the bus-bars not having been carried out on the same lines as those of the other circuits. The design of the switchboard was such that the connections could not be readily traced. It is important with all such switchboards, where the connections are not visible or obvious, that a diagram of the connections should be hung up in the switch room for ready reference before any work is undertaken. A useful precaution adopted in many stations is also recommended, namely, that a second competent person should check the position of the switches and isolating links before any work is commenced.

Of the miscellaneous accidents, several occurred to unskilled persons, and were due to lack of proper supervision. Four occurred on extra-high-tension systems, and were remarkable only because the injuries did not prove fatal.

(To be continued.)

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

B.T.-H. Residence Holophane Reflectors.

A new line of reflectors has been devised by the BRITISH THOMSON-HOUSTON CO., LTD., of Rugby, for use in private residences. They are made on the same principles of light control and distribution as the standard stiletto type reflectors, so that a high degree of efficiency is obtained. At the same time, however, due regard has been given to the æsthetic side of the question. As a result these reflectors not only give excellent lighting effects at night time, but they also have a permanent decorative value.

FIG. 1.—B.T.-H. RESIDENCE REFLECTORS.

The residence Holophane reflectors are made in a number of different patterns, to suit every class and period of electric-light fitting. Some of the shapes are shown in the accompanying illustrations. In every case they have been designed, not only to appear beautiful and to give efficient lighting results, but also to hood or cover the lamp, so that the brilliant filament is not directly visible. The effect given by one of these reflectors with a lighted Mazda lamp inside it is that of a uniformly brilliant surface, throwing out light equally from every point.

The "Stove System" of Electric Ironing.

In many clothing workrooms it is the custom to use solid irons heated on a gas stove. When internally-heated irons are introduced to these rooms it is often found that the cords or tubes, that carry the current or gas to the irons, are inconvenient, and interfere with the use of the irons. In several of the big West End establishments, and in many other factories, the "hot-point" electrically-heated irons made by MESSRS. EASTMAN & WARNE, of 241, Acton Vale, W., have been installed on the "stove" system, and have been found to be highly efficient. Each gas stove is replaced by a substantial shelf covered with fireproof material. A group of three to five ironclad contact-boxes is fixed to the wall by each shelf, and so arranged that when the irons are stood on the shelf they slide into the box and are heated up by current passing through windings inside the irons.

The "hot-point" irons made for this system have automatic loadings; *i.e.*, they attain their proper working temperature very rapidly, and then automatically cut down the current consumption to a very small amount. They hold practically as much heat as solid irons of the same weight; they can, therefore, be used for quite a long time without requiring to be heated up again.

Careful tests of the hot-point irons arranged on this system in comparison with ordinary solid irons heated on a gas stove have shown a saving in running cost of 40 per cent. The further advantages of freedom from risk of fire, increase in amount of work done, and reduction of labour troubles are additional to this saving.

A Lightning-Conductor Bridge.

The testing of lightning conductors is often done with the aid of induction coils and telephones, on account of the electrolytic character of the earth connection. An apparatus recently constructed by Messrs. Dr. Paul Meyer, A.G., of Berlin, to the design of Prof. Ruppel, is mainly intended for facilitating the test in the hands of unskilled persons. Its main feature is an oscillating switch A, fig. 2, which by mechanical oscillations converts direct current into alternating current. This does away entirely with the induction coil. The oscillating switch consists of a tuned steel spring, which alternately applies the positive and negative terminals of a battery to the branches of the bridge. The frequency of the alternating current thus produced is about 17 cycles per second, which suffices even for work on electrolytes, as borne out by tests at the Reichsanstalt.

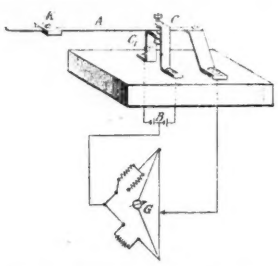


Fig. 2.—Oscillating Switch.

This also allows the telephone to be replaced by a sensitive galvanometer, suitably damped and fitted with a light system which is set vibrating by the alternating current. Instead of a galvanometer deflection, the amplitude of vibration thus gives the reading. The use of a galvanometer, which ensures far greater simplicity and rapidity than a telephone, constitutes a considerable advantage of the new arrangement.

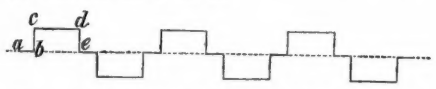


Fig. 3.—Alternating-Current Oscillogram.

Details of the oscillating switch and its mode of working will be inferred from fig. 2: A is the steel spring oscillating between the two contacts C and C_1, which are connected to the two terminals of a battery. Two diagonal points of the Wheatstone bridge are connected on one hand to the spring A, and, on the other, to the

Fig. 4.—"Multimeter" Resistance Bridge.

middle of the battery, the galvanometer G being applied to the two other diagonal points. The number of periods as well as the shape of the curve of the alternating current generated by the switch can be adjusted by varying the position of the weight K.

In fig. 3 is shown an oscillographic record of the alternating current thrown into the branches of the bridge, the frequency being 17. The broken line *a b c d e* corresponds to half a period, the amplitude of the switch spring being near its maximum. As this amplitude decreases, the section *a b* of the zero line is lengthened and *c d* is shortened. The current curve agrees with the pressure curve if the resistances in the circuit are free from inductance. These curves are very regular and well suited for measurements

The oscillating spring A is set working mechanically by causing a rod to strike it as an ebonite button is pressed down. The battery circuit is closed at the same time. The battery is only used during the actual measuring process, that is to say, only so long as the contact button is in its lowermost position. The apparatus can be used for direct-current measurements by pressing down the button only until the spring is just touched. The same ebonite button serves for displacing the sliding contact.

The "multimeter," as the apparatus is called (fig. 4), is equipped with two standard resistances, giving ranges from 0·1 to 20 ohms and from 2 to 500 ohms respectively. Readings are taken in ohms; the apparatus comprises two scales, of which, however, only the one adjusted for is visible.

Helsby Wireless Detectors.

The demand for a reliable detector of the crystal type has led the Automatic Telephone Manufacturing Co., Ltd., of Milton Road, Edge Lane, Liverpool, to design the instrument shown in section in fig. 5. It consists of a brass disk with a large hole in the centre, carrying six crystal cups C, in which the crystals are fixed by means of a special fusible alloy. The disk is held up against a flanged nut on a spindle by the springs D, and can be rotated and moved sideways so as to bring any part of any crystal

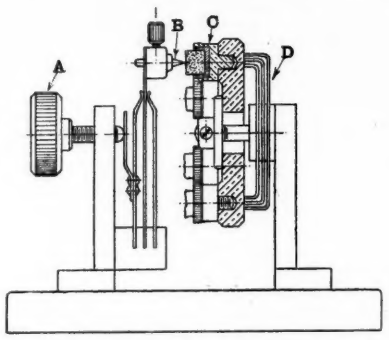


Fig. 5.—Helsby Wireless Detector; Section.

into contact with the point B; the pressure of contact can be adjusted with the greatest precision by means of the screw A and the arrangement of opposing springs shown in the figure. The makers find that crystals of galena of a particular formation give the best results, provided that the pressure of contact is extremely light, and this end is readily attained with the Helsby device. Double headgear receivers wound for use with the detector are made by the company, as well as standard "quenched-spark" apparatus.

COMMUNICATION WITH RAILWAY TRAINS.

On Friday last a demonstration of the "Railophone" and its recent developments was given on the Stratford-on-Avon and Midland Junction Railway, by Railophones, Ltd., in the presence of a large number of representatives of the Press, railway engineers and others, including a deputation from French railways which is at present investigating British methods. We gave a brief account of the system as it then stood in our issue of April 28th, 1911; at that time, while it was proved possible to communicate with moving trains by telephone—*i.e.*, the "Railophone"—it was not yet practicable to actuate signals or effect any other mechanical movement on the train by inductive transmission. A special relay, however, was then in process of evolution, in the hands of Mr. H. von Kramer, the inventor of the Railophone, and Dr. Gisbert Kapp; this relay has now been developed to a high degree of perfection, and was employed in the demonstration last week. The principle employed is one familiar to wireless telegraph engineers: it is that of building up, by resonance, a cumulative effect which eventually attains sufficient amplitude to close a local circuit; that accomplished, there is, of course, no limit to the mechanical operations which may be performed with the aid of a sufficiently powerful storage battery or other electric generator, and electromagnetic mechanism.

At the same time, as the relay can only be actuated by accurately timed impulses of a given frequency, the irregular vibrations due to the motion of the train on which it is carried, or of trains past the signal-box in which it is installed, are powerless to affect it, and thus a very formidable difficulty is overcome. The relay is, indeed, the heart and soul of the system; telephonic and wireless communication with moving trains is not a novelty, but the performance of mechanical movements with unlimited power by inductive transmission to a moving train is, we believe, unique. Naturally so difficult a problem was not solved at the first attempt, and we understand that 25 experimental models were made before satisfactory results were attained; relay No. 26, however, proved a success, and many relays have since been constructed on the lines of this design.

In broad outline, the system comprises an insulated wire laid underground alongside the railway track and connected to the apparatus in the signal boxes and at stations, and a pair of coils wound on frames round a coach, one for sending and the other for receiving, connected with the apparatus mounted in the coach —preferably the guard's van. No change-over switch is necessary when passing from sending to receiving, or *vice versa*. The apparatus carried on the train consists of a 24-volt storage battery (which may be that used for lighting the coach), the detector, an electric hooter, and a magnetic device for applying the ordinary automatic brakes, as well as telephonic and telegraphic instruments. At fixed stations or signal boxes electric gongs take the place of the hooter, and apparatus can be installed to operate signals, &c., with the aid of local batteries.

The demonstration was carried out with the aid of Dr. Silvanus P. Thompson, F.R.S., who received a message from Mr. Russell Willmott, general manager of the railway, on board a moving train, and transmitted a reply. Dr. Thompson also repeatedly stopped the train at a distance by applying the brakes, simultaneously sounding a hooter on the train. A variety of other demonstrations was given, including the following :—A train was run at full speed into a section against a semaphore signal set at danger ; by the *automatic* operation of the system the train was immediately pulled up by applying the brakes, and an alarm signal was sounded at the signal box.

A train was given "Line clear" by semaphore, but the signal was cancelled and the train pulled up by the signalman.

A train entered a clear section ; the signalman left his post, and failed to replace the signal at "danger," whereupon the train automatically restored the signal, locked the lever in the signal-box, and recorded the fact against the signalman.

Assuming that fog prevailed, a train was automatically stopped in front of a signal and prevented from entering the section, until the signalman had released the brakes and sounded the hooter on the train three times as a signal to proceed.

A fast train followed a slow one into a section against the danger signal ; both trains were automatically pulled up.

Two trains started in opposite directions on the same line of rails ; when both arrived in the same section, the brakes were automatically applied and both trains stopped.

All these operations were performed with perfect success. Communication with the train by telephone or telegraph was at all times possible, and audible signals could be, and were, transmitted from the signal cabin to the train and from the train to the cabin at will. The underground wire is divided into sections of lengths corresponding to the signal sections comprised in three groups :— The main section, of 1 to 10 miles or more ; the restoring section, and the clearing section, the last two being each about 100 yards long. The position of a train can, if desired, be indicated continuously by coloured lamps in the signal box, and the danger signal behind a train is automatically locked, so that the signalman cannot give "line clear" while the train remains in the section. In fact, as we have said, any desired movement or indication can now be effected, thanks to the "K K." resonant detector.

At a luncheon which followed the demonstration, Dr. S. P. Thompson, proposing the health of Mr. H. von Kramer, referred to the conservatism of railway engineers, but pointed out their dependence upon new inventions. In his reply, Mr. von Kramer said he had demonstrated only the cardinal principles of the Railophone ; he left the application of those principles to the railway engineers, whose requirements could now be fully met by the manufacturers. He had been asked what would happen if some part of the installation were to fail ; any such failure would give an automatic signal, as a small current was constantly maintained throughout the circuit, the interruption of which was at once indicated. His system was intended not to supersede, but to be superimposed upon, the existing methods of signalling ; the detector, which was the key to the problem, was as reliable as any other relay. Mr. H. Raynar Wilson, the well-known signalling engineer, said he had been very much surprised at what he had seen. He believed they were at the beginning of a revolution in railway signalling, and had taken particular interest in cab-signalling systems during the past year ; but of all that he had seen, there was certainly none that excelled that developed by Mr. von Kramer.

In view of the complete success of the demonstration, the capabilities of the Railophone system cannot be questioned ; it did all that was claimed for it. But the technical solution is not always the end of the struggle, and perhaps the greatest difficulties remain to be overcome, in persuading railway managers to make use of the facilities thus provided by Mr. von Kramer and his colleagues. They, no doubt, are well aware of the fact, and while we tender our congratulations on their present achievement, we wish them good luck in their coming campaign. It may be pointed out that the first practical application of the electric telegraph was to the working of railways, and the telegraph, now indispensable, was then a far greater innovation than the Railophone is in these days of enlightenment. The prospects of success, therefore, are not unfavourable.

Deed of Assignment.—Mr. A. Meadows (W. A. Meadows & Co.), electrical engineer, Percy Street, Hanley.—Creditors of the above should send in particulars of their debts or claims, &c., to the trustee under the deed, Mr. R. E. Clark, Albion Street, Hanley, by July 8th.

BUSINESS NOTES.

Private Arrangement.—Globe Electric Co., Ltd., 11, Farringdon Avenue, E.C.—An adjourned meeting of the creditors in this matter was held on Tuesday last at the Cannon Street Hotel, E.C., when Mr. E. C. Pegler, F.C.A., the liquidator of the company, presided. It will be remembered that the first meeting was adjourned at the instance of a number of creditors, although the liquidator expressed the opinion at the time that an adjournment of a meeting was not in order, as he was advised.

In opening the proceedings of the meeting on Tuesday, the Chairman said that he had called the second meeting without prejudice as to whether an adjournment was in order or not. Proceeding, he said that since the last meeting he had been served with a summons by one creditor. This took the form of an originating summons, and it pressed for his (Mr. Pegler's) removal as not being a fit and proper person to occupy the position of liquidator, and it requested the Court to make such order as it might think fit. This summons had not been taken out in connection with Sec. 188, but was under another section which empowered the Court in the event of a voluntary liquidation taking place to remove a liquidator and appoint another person in his place. Such, said Mr. Pegler, was the present position of affairs, and he had entered a defence to the summons. Before proceeding further, he would like to know whether any creditors present desired to ask him any information with reference to the company's affairs.

In reply, a creditor asked for information in regard to the agreement which had been entered into between the Globe Electric Co. and Mr. Weinert. The chairman said that his recollection was that there were two agreements, one a prior agreement which was subsequently dispensed with in favour of another one. In reply to another creditor, the chairman said that the creditor who had issued the summons was Mr. Weinert, and the Electrical Co., Ltd., had also instituted proceedings. At this juncture a creditor suggested that in view of what had been said, the representative of Mr. Weinert might perhaps tell the meeting what the position was so far as his client was concerned. The representative of Messrs. Michael Abrahams & Sons, solicitors, thereupon said that the position at the last meeting had been that he had informed those present that an important question existed in this liquidation, and that was with reference to certain debentures which had been issued. Having regard to the importance of this matter, he had suggested without, of course, casting any aspersion whatever upon Mr. Pegler, that he ought not to be liquidator of the company, bearing in mind that he was Receiver for the debenture-holders as well, and he hoped that the creditors would emphasise their view of the matter in the same way. Since the former meeting he had taken the advice of counsel, and on that he had taken out an application for the removal of Mr. Pegler as liquidator, and for the appointment of somebody else in his stead. In his summons he had not suggested who should be liquidator, but this no doubt the creditors present would determine, and if they did so, he should in that case, when this summons came on, inform the Court of what the creditors had resolved to do. To some extent the trade creditors might consider Mr. Weinert's position as not being exactly identical with their own. He thought, however, that an independent liquidator in this matter was absolutely imperative. The speaker also referred to the Armorduct Co., who, he said, were alleged to have a claim in the present liquidation. The Chairman, replying, said that the matter as it affected the Armorduct Co. was really a set-off, and they figured on both sides, but there was a net balance against the Armorduct Co. In the course of the discussion which ensued, it was stated that there was another important question, and that was that just before the liquidation the Armorduct Co. took over a portion of the business of the Globe Electric Co., and the speaker said he was informed that no consideration had been paid to the Globe Co. The Chairman said that, as he understood it, this was not so. The gentleman who had made the assertion thereupon said that the information had come to him from his own client, and it had also been contained in a circular sent out on May 31st to the trade.

The Chairman, interposing, said the Armorduct Co. had made him an offer for the rights in the Globe lighting patents, this offer having been made to him as Receiver. Mr. Schmahl, Mr. Atkinson and the Globe Co. were all registered as the joint owners of these patents. Mr. Weinert's solicitor said he did not want to judge the matter there, but he certainly thought that the question of an independent liquidator should be settled, and he thought Mr. Pegler might himself be rather pleased to relinquish his present position.

The solicitor to the company, addressing Messrs. Michael Abrahams & Co.'s representative, asked whether he seriously suggested that the liquidator of the Globe Co. had no claim against his client, because if so, he thought it was an extraordinary proposition. Mr. Weinert's solicitor replied that what he suggested was that the claim against the Globe Co. was for a substantial amount of something like £3,000 odd, and that in regard to any alleged claim which the Globe Co. had against Mr. Weinert, that, so far as he knew, had never been formulated. The solicitor for the company said that whatever might be the merits or the demerits of this claim, he thought that it would be agreed that the matter was one for independent investigation, and he would at once say that so far as the appointment of an additional liquidator was concerned, Mr. Weinert was in duty bound not to have anything whatever to do with it.

The Chairman said that his view was that the creditors should pass whatever resolution they thought fit and proper, and then act on it afterwards.

A solicitor in the room thereupon said that he was in the posi-

tion of a judgment creditor who would very much like to get his money. It appeared to him that the present liquidator was Receiver for the debenture-holders, and in that capacity some difficult questions might arise. A question might crop up as to the validity of the debentures, and then the position would be that the liquidator would have to challenge these debentures, and would have to take an action against himself as being in the capacity of Receiver. Now, it was obvious that this would not do at all. They were now told that someone had issued a summons to move for another liquidator, but it seemed to him that another liquidator might be appointed to act with Mr. Pegler, and he would suggest Mr. Corfield.

Mr. Scholey said that undoubtedly it would be more harmonious if Mr. Corfield were associated with the present liquidator, and for the reason that the Receiver now possessed practically all the assets, and nothing could be derived by the creditors unless the Receiver was friendly. If this business was realised quickly the result would be bad for the creditors; but if, on the other hand, it were realised with due regard to the creditors' claims, there might be something in it. As to Mr. Weinert's action, he did not think that concerned the trade creditors one iota. In any case, he thought that any liquidator who now took on the liquidation of this company would be in a most unenviable position.

The solicitor for the company then said that, speaking on behalf of Mr. Pegler, that gentleman would be pleased to have anybody nominated with him as liquidator. There was undoubtedly a good deal in what had been said by creditors as to the position which the liquidator in this matter should occupy, but he could only tell them that in regard to this company there was no desire to conceal anything, and all the facts would be put before the creditors. Some question had been raised as to the constitution of the debentures, and these facts likewise could be gone into. If the desire was to appoint someone jointly with Mr. Pegler, then the latter would be only too pleased to act with him.

In the result, a resolution was passed nominating Mr. Corfield as joint liquidator with Mr. Pegler, and a committee of inspection was appointed, consisting of the representatives of Ships' Carbons, the Sloan Electrical Co., and Messrs. Francis A. Perryn.

Correction.—With reference to our notice respecting the contract for the electrification of the South-Eastern Railway Co.'s shops at Ashford, Messrs. Tyler & Freeman inform us that the British Westinghouse Co. received this contract, and that they are acting as sub-contractors to the latter for the wiring work only.

Change of Address.—The offices of the Wakefield Corporation Electricity Department have now been removed to new premises, and all communications should be addressed to the City Electrical Engineer, Old Town Hall, Crown Court, Wakefield.

Eastern Canada.—The Imperial Trade correspondent at Toronto (Mr. F. W. Field) writes that one of the outstanding features of the year has again been the establishment of branch plants in Canada by United States firms. In this connection, particular attention is being paid by United States manufacturers of agricultural implements, who appear to be making Ontario the manufacturing centre for their Canadian business, with distributing houses in Western Canada.

There is a likelihood of some electric railway construction being undertaken in Ontario during the coming year. Probably in the next few years marked activity will exist in this direction, as there is a disposition to build electric radial lines from the suburban towns and villages to the large centres of population.

General conditions in Ontario during the past year were satisfactory and the crop was an average one. Many additions were made to manufacturing plants, a greatly increased output was recorded, and there were numerous cases of inability to cope with the demand for goods. The factories, on the whole, are well equipped with modern machinery and are making headway in efficiency and economical production. Developments along these lines are expected during the coming year. Mr. Field adds that a large number of catalogues of British firms were received by him during the year 1911, and were distributed as desired by their senders. He suggests, however, that business returns are not likely to be secured in this way.

The Imperial trade correspondent at Quebec reports as follows: Electric wire and fittings are imported from the United States because they conform with the standards set by the Canadian underwriters, but there does not appear to be any reason why British manufacturers could not provide similar grades if they wished to compete for this trade. Artistic shades of most expensive qualities for electric lamps are imported from Austria in very considerable quantities.

Judging from instances which have been brought to notice, the German system of delivery through representative firms is popular, and the practice of many United States firms of frequently sending expert salesmen, well supplied with well got-up catalogues, to prospective buyers, often secures orders, irrespective, to a certain extent, of the comparative values of the goods. There appears reasonable grounds for expecting that large contracts will be let and considerable work done in the Quebec district during the next two years. The Government have decided to build large new immigration buildings of a permanent character. The long-discussed graving dock will probably be decided upon and a contract for its construction entered into. Proper accommodation for the grain and other trans-continental traffic, including elevators and freight-handling machinery, will have to be provided in anticipation of the completion of the Trans-Continental Railway. A car ferry will probably be required to transfer the cars of the Trans-Continental Railway across the river during the interval between the completion of the railway and the completion of the bridge, possibly five years later. Provision for the repair of naval vessels will also have to be made at some point on the St. Lawrence, possibly at Quebec. Several new railways are also either under construction or in contemplation in the vicinity of Quebec.—*Board of Trade Journal.*

Bankruptcy Proceedings.—George Edward Hervey, gas and electrical engineer and ironmonger, 24, Susan's Road, Eastbourne.—The Receiving Order herein was made on the debtor's own petition, and, according to the accounts filed, the gross liabilities amount to £268, of which £242 is expected to rank for dividend. The assets are estimated to produce £80, less £16 for preference claims, leaving a deficiency of £177. It appears that the debtor started business in 1907 in partnership with another, they having a joint capital of £45. The partnership was dissolved in March, 1910, the partner receiving £50 as his share, the debtor since continuing the business alone. The business has declined very considerably lately, owing to depression in the building trade. The failure is attributed to the lack of capital, depression in trade, bad debts and depreciation of stock. The debtor's household furniture was sold in May last for £50, in order to pay off an overdraft at the bank which was secured by a relative. The business has been closed, and the stock and loose fittings removed for sale.

A. G. Adamson, electrical engineer (late 22, Christopher Street, Finsbury Square, London).—July 17th is the last day for receipt of proofs for intended dividend, by the trustee, Mr. C. Mercer, 14, Bedford Row, London, W.

Trade Announcements.—Messrs. Samuel Deacon and Co., advertisement agents and contractors, have removed to No. 7, Leadenhall Street, E.C., nearly opposite their old premises, which have been acquired by a large insurance company.

Mr. Arthur P. Haslam, asks us to state that his telephone number, and that of the Westminster Tool and Electric Co., has been changed to "City 54."

Messrs. Scholey & Co., Ltd., of 151, Queen Victoria Street, E.C., have arranged to act as representatives in this country for the Tool Steel Gear and Pinion Co., of Cincinnati, Ohio, whose products are widely used on electric tramways and railways in the United States.

The Forest City Electric Co. has removed to Clegg's Court, Chapel Street, Salford.

Book Notices.—"Studies in Radioactivity." By W. H. Bragg. London: Macmillan & Co. 1912. Price 5s. net.

"*Proceedings* of the American Institute of Electrical Engineers." Vol. XXXI, No. 6. June, 1912. New York: The Institute. Price $1.00.

"*Bulletin* Mensuel, de la Société Belge d'Electriciens." Vol. XXIX, No. 4. April, 1912. Brussels: Emile Bruylant.

"*Bulletin* of the Association des Ingenieurs Electriciens." May 6th, 1912. Liége: The Association. Price 6 fr.

"*Journal* of the Institution of Municipal Engineers." June, 1912. London: The Institution. Price 1s.

"*Journal* of the United States Artillery," with "Index to Current Military Literature." Vol. 37, No. 3. May-June, 1912. Fort Monroe, Va.: Coast Artillery School Press.

"*Proceedings* of the Physical Society of London." Vol. XXIV, Part IV. June 15th, 1912. London: *Electrician* Printing and Publishing Co., Ltd.

Liquidations.—Simplex Superheater Co., Ltd.—This company is winding up voluntarily, with Mr. C. A. M. Buckley, 40, Tweedy Road, Bromley, Kent, as liquidator.

Caribbean Anglo-Colombian Cable Co., Ltd.—A meeting is called for August 2nd, to hear an account of the winding up from the liquidator, Mr. A. R. Bennett.

Catalogues and Lists.—The Union Electric Co., Ltd., Park Street, Southwark, London, S.E.—Pamphlet No. 118, of 12 pages, dealing with the electric driving of machine tools, and illustrating a number of drilling machines, lathes, shears, punch, circular and cold saws, driven by Union D.C. or three-phase motors.

Messrs. Siemens Bros. Dynamo Works, Ltd., 38 and 39, Upper Thames Street, London, E.C.—28-page pamphlet (No. 5·18) containing an admirably illustrated account of the Siemens "G5" watt-hour meters for direct or alternating circuits. Instructions for use are given, with diagrams of connections, and illustrations clearly showing how the renewal of parts is carried out.

Messrs. Rose Bros., 38 and 39, Beech Street, Barbican, London, E.C.—56-page fully illustrated catalogue, giving brief particulars and prices of a variety of small electrical manufactures, including the following: Pocket, hand and torch electric lamps of many types, cycle lamps, battery reading lamps, watch stands, decorative table lamps, "Schmidt" dry cells, "White Star" dry cells, battery lamps, ignition and lighting accumulators, medical coils, small motors, motor-car accessories, electric bells, &c.

Messrs. W. A. Walber & Co., 38, Victoria Street, London, S.W.—Illustrated pamphlet concerning their machine tool department, giving a list of the principal types of machines made by their principals:—Scriven & Co.; Ward, Haggas & Smith; J. Beardshaw and Son, Ltd.; Clifton & Baird, Ltd.; and Clark's Machine Tool Co. (1907), Ltd.

The Century Electric Co., St. Louis, U.S.A.—Bulletin No. 18 (48 pages), in which appear excellent illustrations and full particulars of the Century single-phase self-starting motors.

THE BRITISH ANTI-VIBRATION AND NOISE CO., LTD., 105, St. Vincent Street, Glasgow.—24-page pamphlet entitled "The Isolation of Vibration and Noise," in which the subject is dealt with in an interesting manner in respect to electrical machinery, Diesel plant, shafting, printing presses, shearing and other machinery. The firm manufacture a number of different materials for use in machinery isolation, as follows: Iron-framed natural cork for heavy foundations; resilient plates, for placing under girders, rail chairs and sleepers, and for pads under railway carriage and tramcar bodies; patent anti-vibration isolators for all classes of machinery; and "Silence," a material specially made for surrounding noisy machines, telephone boxes, and gear cases.

THE AUTOMATIC TELEPHONE MANUFACTURING CO., LTD., Milton Road, Edge Lane, Liverpool.—New pamphlet describing, with diagrams, the Helsby wireless detectors and headgear receivers, and giving prices of same.

THE BOSCH MAGNETO CO., LTD., 40-42, Newman Street, London, W.—Two pamphlets (10 and 12-pp. respectively) containing descriptions, accompanied with detailed diagrams, of the Bosch patent force-feed lubricators, type "A C" (from two to eight feeds) provided with sight feed, and type "L" (from four to eight feeds) specially designed for very large stationary and marine engines, and a statement of their advantages. The firm are now constructing lubricators arranged with from 1-16 feeds, also with double tanks for supplying both cylinder and ordinary lubricating oil.

MESSRS. BAXENDALE & CO., LTD., Miller Street, Manchester.—Catalogue of 56 pages containing profusely illustrated particulars, with price information, of a great variety of electric bells, bell pushes and plates, indicators, batteries and accessories, medical coils, speaking tubes, and lightning conductors. Several pages are occupied with connection diagrams for bells. In many cases prices have been reduced. A separate 8-page list (No. 21,651) shows, and states prices of, electric fans of a number of types, table fans, lampholder fans, battery fans, porthole, exhaust and ceiling fans, also speed regulators.

MESSRS. OZONAIR, LTD., 96, Victoria Street, London, S.W.—New edition of their catalogue No. 1, "Ozonair Apparatus for General Purposes," containing illustrations, prices, and other particulars, of Ozonair portable generators for purifying the air in rooms of from 3,000 to 12,000 cb. ft. capacity, for connecting to supply circuits or to portable accumulators. These apparatus are made in a variety of patterns, for standing on the table (horizontal or vertical current of ozonised air); for fixing on the wall; with medical fittings, &c. The consumption varies from only 10 watts to 130 watts, so that they can be connected to any lampholder or plug. The catalogue also contains interesting information regarding the nature of ozone, and the many public and industrial purposes to which the firm's apparatus can be applied.

MESSRS. JULIUS SAX & CO., 24A, High Street, New Oxford Street, London, W.C.—Supplementary illustrated list of eight pages, giving prices, &c., of a number of electrical accessories, including wall plugs, tumbler switches, candle fittings, adaptors, automatic plug switches, wood blocks, &c.

MESSRS. BRUCE PEEBLES & CO., LTD., Edinburgh.—New pamphlet, No. 21B of 20 pages, dealing with their medium size self-contained type continuous-current dynamos and motors. The list opens with a specification of various types (protected, semi-enclosed, totally enclosed, and mining), and later gives the ratings and efficiencies of the different frame sizes at standard voltages for protected, semi-enclosed, and totally-enclosed machines. Special attention may be drawn to the Peebles standard mining type motor, which is the outcome of many years' experience of the conditions prevailing in mines. Approximate weights and dimensions of all machines listed are stated.

MESSRS. ECLIPSE ELECTRIC CO., 6, Cambridge Road, Great Crosby, Liverpool.—Leaflets giving prices, &c., of "Harvey" electric vacuum cleaners, and "Whipple" electric tire pumps.

THE BRITISH THOMSON-HOUSTON CO., LTD., Mazda House, London, E.C.—Eight-page price list No. 352, relating to the B.T.-H. "Eye Rest" system of indirect lighting, illustrating every type of "Eye Rest" fitting, and giving reproductions of eight photographs of interior lighting on this system, including examples of residence, hotel, office, theatre, ball-room, and picture gallery illumination. Full information respecting prices, reflector types, and finishes is given, together with instructions for ordering and conditions of sale and delivery. Examples of the system can be seen at, and copies of the list obtained from, Mazda House.

THE STERLING TELEPHONE AND ELECTRIC CO., LTD., 200, Upper Thames Street, London, E.C.—The company has just issued the eighth edition of its new full catalogue of telephonic and electric bell manufactures. It consists of about 160 pages, bound in strong stout covers, containing illustrations, brief particulars, and prices of a large variety of items—about 1,200 in all—including Parlyphones, "Twencen" domestic telephones, "Primax" automatic interphones, secret conversation interphones, a large selection of telephones and signalling apparatus for use in mines, central battery instruments and switchboards, traction telephones, military railway and other portable sets, electric blasting machines, pushes, bells, relays, syrens, indicators, fire alarms, medical coils, batteries, wires, insulators, &c. The revised prices which came into force on July 1st are given in the list. The frontispiece consists of an illustration of the firm's works at Dagenham, Essex, and internal views appear of several of the principal departments, of which we recently gave an illustrated description. The catalogue includes a full range of diagrams of connections, and a telegraphic code.

For Sale.—The City Electric Lighting Department, Leeds, has for disposal a quantity of metal, and copper wire. Messrs. P. Huddleston & Co. will, on Tuesday, July 9th, at Dalling Road, Hammersmith, sell by auction a large quantity of electrical apparatus. See our advertisement pages in this issue.

LIGHTING and POWER NOTES.

Accrington.—The Electricity Committee has had under consideration an application from the Albert Mill Co. for a supply of current to drive the company's mill in Victoria Street, the estimated consumption being 200,000 units per annum. The Committee acceded to the request on the following terms and conditions, viz., the price to be 525d. per unit, this price allowing for not exceeding 5 per cent. of the consumption for lighting purposes, with the usual condition as to fluctuation in the price of coal. Period of supply, five years. The consumer to be entitled to any reduction of the scale of charges made at any time for similar supplies and quantity of consumption.

Aberdare.—The U.D.C. has decided to apply for a loan of £12,000 for developing the electricity works in order to provide current for lighting at Aberaman and other parts of the district, and power for the proposed tramways.

Arnside.—The Traders' Association is endeavouring to raise funds for lighting the front by electricity for six weeks during the season in accordance with the suggestions of Mr. T. Wilkinson, electrical engineer.

Birmingham.—The City Council has approved of the recommendation of the Electric Supply Committee that the cost of works authorised by the Council at Dale End, Harborne and Aston Manor sub-stations, be increased to the extent of £688.

Bourton-on-the-Water.—The ratepayers here have decided by 68 votes to 9 in favour of an electric supply scheme by means of overhead lines submitted by the Rural Electric Supply Co., who offer to supply current at not above 8d. per unit. The Stow-on-the-Wold R.D.C., in whose area Bourton is situated, has assented to the company applying to the B. of T. for a licence.

Bradford.—The balance-sheet of the Corporation Electricity Department for the year ended March 31st last shows a profit of £8,052, as compared with £8,980 in the previous year. The total income amounted to £119,892, as against £118,100. Sales of current, other than for tramways, increased by £4,610. During the year current was supplied to the tramways department at 1d. per unit, as against 1½d., a reduction which represented no less than £5,000 to the electricity undertaking. The total capital expenditure to March 31st last was £825,038, against which there is a present debt of £498,000, which is less than the debt last year by £9,000, notwithstanding the expenditure during the year of £25,000 on extensions.

Clacton-on-Sea.—The electrical illumination of the sea front was inaugurated on Saturday. Twenty arc lamps, each of 3,000 C.P., have been installed by Messrs. Johnson & Phillips, Ltd.

Continental Notes.—SWITZERLAND.—The hydro-electric works at Augst-Wyhlen, which have been established by the city of Basle in conjunction with the Rheinfelden Power Transmission Co., are now approaching completion after work extending over four years, and are to be brought into operation in the ensuing autumn. The works are situated between the Swiss village of Augst and the Baden locality of Wyhlen, where the river Rhine forms the frontier between German Baden and Switzerland. A large dam has been built across the river at the joint expense of the two parties interested, the cost being put at £200,000, whilst the hydro-electric plant on the Baden bank belongs to the Rheinfelden Co., and that on the Swiss bank to the city of Basle. There are 10 openings in the dam of a width of 56 ft., which can be closed by heavy iron gates of a height of 30 ft. By the raising and lowering of the gates the water level above the dam is maintained, except in periods of high water, at the same height of 880 ft. above the sea level throughout the year. During low water the Rhine delivers about 300 cb. m. of water per second at Wyhlen, but this rises to 5,000 cb. m. at times of high water. The height of the dam corresponds to the useful fall at which the turbines work, and amounts to 27½ ft. at low water; the fall is 21½ ft. with average water, and is still 20½ ft. in the favourable period of summer, when the flow of the river is 1,200 cb. m. per second. The gates, which weigh from 90 to 95 tons, are suspended by chains, and are raised in 20 minutes by means of electric motors of 50 H.P., although they can be elevated by hand. Both installations are of the same type, each being arranged for 10 Francis turbines of from 1,600 to 2,000 H.P. The total normal output in each case is 15,000 H.P. measured on the turbine shaft. The output decreases to from 20 to 30 per cent. below the normal in periods of low water, and also in times of high water, in consequence of the large reduction in the fall. In both cases the deficiency has to be met by reserve steam plant; the reserve for Basle is located in

the city itself, whilst the Rheinfelden company has erected steam plant on the Wyhlen bank in the immediate vicinity of the turbines. If all the 10 turbine units were simultaneously in operation under normal water conditions, each would have to yield 1,500 H.P. As, however, it must be possible to stop individual turbines for repairs, &c., without reducing the total output, and as the fall largely varies, the performance of each unit has been fixed at 1,600 to 2,200 H.P. in order to secure full utilisation of the plant. Each of the four wheels of each turbine unit has, therefore, to produce from 400 to 500 H.P. The turbines are outside the machinery house, and the dynamos are arranged directly on extensions of the turbine stages, and have a speed of 107 R.P.M. The energy from the Swiss plant is transmitted at 7,000 volts to transformer stations in Basle, and that produced by the Baden plant can be raised to 40,000 volts in the transformer station combined with the beforementioned reserve steam station.

SPAIN.—La Compagnie d'Energie Electrique du Centre de l'Espagne, which has lately been formed in Paris, will take over the existing electricity-generating stations at Valdepenas and Manzandres, and will also put down a new plant to utilise the water power of the Ruidera falls.

RUSSIA.—The Second Department of the Council of Empire has formally endorsed a resolution of the Cabinet for the granting of a concession for 75 years for the utilisation of the water powers of the Caucasus and the transmission of electric power at high tension throughout that region, to a British engineer, Mr. Stewart, with powers to transfer his rights to a foreign company.

Croydon.—The T.C. has applied to the B. of T. for permission to supply current in bulk to the County of London Electric Supply Co., Ltd., the undertakers under the Croydon Rural E.L. Order, 1905.

Devonport.—The T.C. has received from the L.G.B. sanction to a loan of £9,983 for extensions to the buildings and plant at the electricity station.

Eastbourne.—The B. of G. has decided to have the pumping plant at the workhouse well worked by electricity, which will be supplied by the Corporation, and cost from 2½d. to 3d. per hour.

Eccles.—The Town Clerk of Eccles has been instructed to write to the Town Clerk of Salford, informing him of the Committee's readiness to consider any proposal which may be made by the Salford Tramways Committee as to the price to be paid for electrical energy for the tramways.

Farnworth.—The Lighting Committee has decided to adapt 30 of the ordinary street lamps for incandescent lighting, and as a result of a conference between the Lighting and Electricity Sub-Committee it has been agreed to discontinue the arc lamps throughout the town.

Haslingden.—Several applications having been received from owners of mills in the Helmshore district for a supply of electricity for power purposes, the Tramways and Electricity Committee has resolved that the whole question of erecting a high-tension cable from the electricity works to Helmshore be referred to the chairman and vice-chairman, and that the latter be requested to report fully thereon to a subsequent meeting.

Heybridge.—The P.C. has entered into a contract with Messrs. May & Butcher for public lighting by electricity. This will supersede oil lamps, and current will be supplied from the firm's power station.

Hull.—The gross revenue of the electricity department for the last year amounted to £67,773, an increase of over £6,300; working expenses amounted to £35,768, leaving £32,005 gross profit, and after meeting financial charges, a net profit of £6,067, which was carried to reserve. The unappropriated balance of the later fund amounts to £14,206—some £36,000 having been applied for capital purposes. During the year approximately 13 million units were generated, and nine million sold; the maximum demand was 5,970 KW. The works cost was 77d. per unit (a slightly higher figure than in 1911, attributed to special circumstances); the total working cost was 96d., and the overall cost per unit 1·64, or the same as in 1910-11. The engineer, Mr. Bell, is of opinion that progress in the future will be considerably greater than during the past.

Ilford.—The U.D.C. has decided to improve the lighting between Scrafton Road and Hunter Road, Ilford Lane, by replacing 13 arc lamps with bunch lights of 400 C.P.

Kirkcaldy.—Treasurer Kilgour states that the Corporation electricity undertaking showed a loss for the year of £239. The extra cost of coal due to the strike was about £700, and the output of the undertaking had also been diminished through the same cause. The tramways showed a surplus for the year of £1,324.

Leicester.—The T.C. proposes to apply to the B. of T. for an order extending the area of electricity supply to the parishes of New Parks, Oadby, Evington, Humberstone and Birstall. The application will be considered at a special meeting of the Council on July 30th.

London.—BETHNAL GREEN.—The Electricity Committee reports that in October last the Council decided to engage the services of Mr. J. F. C. Snell to prepare a scheme for electricity supply, upon which tenders could be invited by the Council. He advised that before he proceeded further, inquiry should be made from the Borough Councils of Hackney, Poplar, Shoreditch and Stepney, and also from the City of London E.L. Co., the Charing Cross Co., the County of London E.S. Co., the London E.S. Corporation, and the South London E.S. Corporation, as to the terms and conditions upon which they would be willing to supply electricity in bulk to Bethnal Green. Also that alternative quotations should be invited for a direct current and a three-phase alternating-current supply. Mr. Snell estimated a minimum sale of 1,000,000 units per annum from the commencement of a supply. At the present time over 300,000 units are supplied from the public mains in the borough. After considering the proposals, Mr. Snell advised the purchase of high-tension alternating three-phase energy from Stepney B.C., and that the Council should transform it to a lower pressure for general distribution. At the same time it would also be available in the form in which it was obtained. If the tender of the Stepney Council were accepted, it would be necessary to erect two sub-stations in the borough, each of which would contain, to begin with, transformers aggregating 750 KW., and be adequate for an increased accommodation of 2,000 KW. Mr. Snell advises that a sale of only 500,000 units a year at the very low average receipts of 2·028d. per unit, will enable the undertaking to pay its way after the payment of interest and sinking fund on the capital outlay. That is to say, less than 200,000 further units are required in addition to the consumption already supplied (300,000). Acting upon the recommendation of Mr. Snell, the Town Clerk was requested to negotiate with the Stepney Borough Council as to whether that authority would be willing to undertake the administration of an electricity undertaking in the borough. This, the Committee had ascertained, the Stepney Council would undertake. The Committee did not anticipate there would be any difficulty in effecting a satisfactory agreement with Stepney for the purpose of giving effect to the recommendation of Mr. Snell, that the Stepney Council should work the undertaking on behalf of Bethnal Green, with a view to enabling the latter Council to afford a supply of electricity at the lowest possible cost. The Committee recommends that the Council accept the proposal of the Stepney B.C. for a supply of electricity in bulk to Bethnal Green on the extra-high-tension three-phase system for a period of 15 years, at a charge, in accordance with a sliding scale, of £3 per KW., and 0·25d. per unit; that the Council adopt a three-phase four-wire system of distribution of electrical energy in accordance with the recommendation of Mr. Snell; and that, subject to the completion of the proposed agreements, application be made to the L.C.C. for sanction to raise a loan of £21,420 for the inauguration of the undertaking as recommended.

WOOLWICH.—The Electricity Committee reports having considered the report of Mr. J. F. C. Snell on plant extensions necessitated by the increased load and by future increased demands. After dealing in an exhanstive manner with the whole situation, Mr. Snell makes the following recommendations: (*a*) "That an extension be made at Globe Lane station of 3-1,250 (or 1,500) KW. turbo-alternators with the necessary extra boilers and extension of buildings; that the building extensions should be made at the south end of the present station, and water-tube boilers with marine casings, underfeed stokers, &c., be adopted; and that a properly designed circulating system for the condensers should be laid down with rotary strainers and change-over suction and discharge pipes." (*b*) "That application be made to the L.C.C. for a loan not exceeding £50,000 for the above purposes." Having given the matter careful consideration, the Council has decided to carry out the works recommended. In connection with the acceptance of the tender of Messrs. Mirrlees, Bickerton & Day at £10,175 for the supply of two 340-KW. oil sets a short time ago, Mr. Snell being unable to advise at present the installation of oil sets, the Council has rescinded its resolution accepting the tender.

ST. PANCRAS.—The gross income on revenue account of the electricity undertaking for the year ended March 31st last, amounts to £85,214, which is an increase of £3,845 over the previous year. After paying all working expenses, repayment of loans, interest, &c., and providing for accrued charges, a profit remains on the year's working of £12,436, this being a decrease of £766 on 1911. To this profit the balance of £4,328 from last year is added, increasing the balance to credit of net revenue account to £16,765, of which the sum of £4,000 is to be retained as a working balance. Regarding the reserve fund, the balance in hand at the commencement of the year was £40,517, to which is added £947 for interest on investments during the year, which makes a total credit of £41,465 in the fund at the end of the year. This balance is represented by cash at the Council's bankers and £20,439, the balance of the loan advanced to the capital account. The capital expenditure payable out of loan during the year was £10,639, which has been incurred in the provision of mains, machinery, services, &c. The revenue derived from the sale of units at 3d. per unit amounted to £27,025, while £44,633 resulted from the sale of units at 6d. per unit, and under, to 3d. per unit. The cost of generation amounted to £28,028 as against £26,950 in 1911.

Manchester.—The annual report of the Corporation electricity department shows that the sales for 1911-12 totalled over 93 million units. The year's trading resulted in a net surplus of £28,319, of which £24,500 goes to the relief of the rates. Sales of current showed an increase of over £30,000. The downward trend of the cost of production, however, was seriously arrested by the high prices paid for fuel during March, and the effect on the supply caused by exceptionally unfortunate breakdowns of plant. The working expenditure, exclusive of depreciation, showed a rise from £189,026 to £215,895 last year.

Perth.—On receiving an assurance that under the Loch Ericht Water and Power Bill, it is now simply proposed to take

water from the River Ericht, use it for power purposes, and again discharge it into the river, and that a clause to this effect will be inserted in the Bill, the Town Council has withdrawn its opposition to the measure.

Rochford.—The B. of G. on June 25th considered a recommendation from a Committee in favour of the installation of an electric lighting and heating system at the workhouse at an estimated cost of £6,320, and the matter was adjourned for two weeks. The scheme has been prepared by Messrs. Dolby and Williamson, of Westminster.

Sevenoaks.—The U.D.C. has provisionally consented to the following terms being inserted in the transfer of the E.L. order to Messrs. Crompton & Co., Ltd. :—Public street lighting, maximum price 2d. per unit ; interior lighting of public buildings, maximum price of 4d. The Council has asked Messrs. Crompton & Co. to agree to pay all charges up to £450, and to give security for costs which may accrue from this date in the event of the transfer not being effected by reason of the proposed company not being formed, or of its falling through.

Southborough.—The U.D.C. has granted the Tunbridge Wells T.C. permission to lay lighting cables from Broomhill along Speldhurst Road for the purpose of supplying current at Speldhurst. The Council is to consider the advisability of applying for a provisional order for electric supply.

Southgate.—The offer of the North Metropolitan Electric Power Supply Co. has been accepted for the lighting of Green Lanes main road for a period of five years.

Stalybridge.—On Friday last Mr. T. C. Ekin held a L.G.B. inquiry into the application of the Joint Board for sanction to borrow £31,850 for electricity purposes. It was stated that the plant required was a 3,000-KW. turbine and condenser (£8,500); steam, exhaust and water piping (£600); switchgear and cable connections (£700); three Lancs. boilers (£1,800); superheaters (£850); boiler house buildings (£1,500); three mechanical stokers (£450); conveyor and coal bunkers (£500); boiler and pipe covering (£150); boiler seatings (£350); economiser (£750); feed pumps, pipes and valves (£700). Mr. Blackmore stated that they would have to make application shortly for further plant, and he asked the Inspector if he would consider the advisability of amending the application to the L.G.B. for two plants instead of one.

The Inspector said he took it that application would be for £9,800, which would bring the application up to over £40,000.

Sunderland.—A L.G.B. inquiry was held on June 26th, before Mr. H. R. Hooper, into the application for sanction to borrow the sum of £37,200 for the extensions of plant and mains, and the renewal of mains in connection with the electrical undertaking. Mr. G. D. Duncan, the assistant town clerk, said the application was made on account of the pleasing renewal of activities in the shipbuilding and engineering world. The largest item in the amount to be borrowed, it was stated, was from £20,000 to £22,000 for new plant. Some of the new plant was required for Dunning Street station, which was used as a stand-by. In reply to a question, the Inspector was informed that it was two or three years since steam was up at Dunning Street, and he said he thought they ought to consider whether they should not supersede certain of the plant at Dunning Street. He then turned attention to the loans on plant which is now superseded, and Alderman Bruce (chairman of the Electricity Committee) said he hoped the Board would bear with the Council a little longer. The Inspector said the Board could not make exceptions between local authorities. Alderman Bruce said there were exceptional circumstances with regard to Sunderland during the last three years. They depended very largely for their consumption of power upon shipbuilding and engineering industries, and it was a matter of notoriety that for two years the shipbuilding industry was doing nothing. Under these circumstances, they found it very difficult to make both ends meet, and during this same period they paid a considerable sum out of revenue for alterations at Dunning Street station by substituting motor-driven for steam-driven plant. The Inspector pointed out that the Council was applying for sanction to make fresh capital expenditure obviously for the purpose of superseding plant for which it had already made capital expenditure, and the L.G.B. would not sanction two loans for the same plant. If one plant superseded another they must meet the cost out of a reserve fund, or from revenue in a proper way. Alderman Bruce: Unfortunately, we have never been able to do it out of reserve funds. The Inspector added that they had had plenty of time to find out that the plant would not last as long as the period of the loan, and they ought to have put by money for that contingency. Many other authorities had done that. Alderman Bruce later asked whether the L.G.B. would grant a short loan for the superseded plant, and the Inspector said they would grant a loan for three years. At the conclusion of the inquiry, Alderman Bruce asked that the Board might give a decision as quickly as possible, because manufacturers were anxious that the new plant should be installed. The Inspector said so far as the evidence went, it appeared clearly that the additional plant was very desirable, and he should be prepared to advise the Board accordingly.

Tripoli.—Following on the occupation of the district by Italy, a central station for the supply of electrical energy for lighting and power purposes has been established in the town of Tripoli. The plant, which has been put down by an Italian syndicate, was supplied by Messrs. Tosi, of Legrano, La Société Italiano Largen and Wolff, of Milan, and La Société Tecnomasio Italiano.

Wednesbury.—A new departure is about to be made with the electric light undertaking, judging from a statement made by Alderman Griffiths (chairman) at a meeting of the T.C. on Monday. The alderman said that in February a resolution was agreed to by the Committee that new engines should be purchased at a cost of £3,500, but shortly afterwards they thought it wise not to carry out the resolution in its entirety. He intimated now that it was the intention of the Committee shortly to bring forward a new scheme for making extensions on a new site, which would be on the canal or railway, or both, although the present station would still be useful for stores, offices and for generating purposes.

Worksop.—The U.D.C. has received from the B. of T. permission to utilise overhead wires for supplying current to outside portions of the district.

TRAMWAY and RAILWAY NOTES.

Belfast.—At the monthly meeting of the Corporation the question of a universal penny fare over the tramway system, which had been adopted at the previous meeting, again came up for discussion, and after an animated debate the proposal was negatived by a small majority. A motion was subsequently passed fixing the tramway fares at the present rate for the ensuing year.

Continental Notes.—AUSTRIA.—As will, perhaps, be remembered, a French financial syndicate is in competition with a group of Vienna banks in regard to the proposed conversion of the Vienna City Railway and the construction of new underground electric railways. The electrical firms associated with the Austrian banks in question are the Siemens & Halske Co., and the A.E.G., of Berlin, whose engineers have submitted a report on the subject for the guidance of the banks in their negotiations with the Vienna Traffic Commission. According to the scheme prepared by the Berlin companies respecting the City Railway, only the lines serving the requirements of the interior of the city would be transformed, the total length being 20 miles. A mixed service of locomotives and motor-cars would be introduced, with overhead conductors ; the expenditure is estimated at £1,250,000, and the work would mostly be completed by the end of 1914. As far as the projected underground railways are concerned, the scheme provides for the construction of three lines during the initial period of the work with a total length of 8½ miles, and of two further lines with a total length of 4·2 miles in the second term of construction. The outlay on the former is said to be computed at £5,000,000. The underground lines would be narrow gauge, so that an interchange of traffic with the City Railway would be out of the question, and the supply of direct current for working them would be furnished by the municipal electricity works which would have to erect sub-stations for the purpose. The report expresses the opinion that if the capital already invested in the City Railway is left out of consideration, the present deficit on working would disappear after the inauguration of electric traction and the opening of the underground lines, and that interest and redemption on the new capital would be earned after a few years' working. On the other hand, it is estimated that a period of from 15 to 20 years would elapse before the underground lines would be able to yield 4½ per cent. on the capital expenditure. These assumptions have induced the Vienna banks to inform the Traffic Commission that it will only be possible to raise the capital for the underground lines if the interested corporations—State, city and province—agree to make a corresponding contribution towards the work. The French financial group, however, regards the prospects as being more unfavourable in the case of the city railway, and a considerable contribution is also required if the work is to be undertaken. The estimates of the Berlin companies provide for the grant of a concession for the whole network for 90 years, and exemption from taxation for a period of 25 years.

It is proposed to adopt electric traction on the railway between Meran, Bozen and Mals, in the Tyrol.

RUSSIA.—A scheme has been brought forward for the conversion to electric traction of the St. Petersburg junction railways in connection with the projected transmission of power from the rapids of the Walchow, to which reference was recently made. The experiments are to be carried out at the cost of the State, as the Ministry for Railways has adopted a sympathetic attitude towards the scheme, which contemplates the use of H.T. alternating current.

Conway.—The promoters of the Vale of Conway Light Railway have decided to apply to the Light Railway Commissioners for powers to enable them to extend the line from Trefrew to Gwydyr, to make a deviation from the original route at Llanbedr, and to abandon about 9 miles of the intended railway.

Coventry.—The T.C. has applied to the B. of T. for a loan of £220,538 for the purchase of the tramways undertaking.

Doncaster.—The Light Railway Commissioners will on July 19th hold an inquiry into the application of the T.C. for an order for extending the Corporation tramways.

Glasgow.—The tramway department's accounts—published recently in the REVIEW—were confirmed and passed at the last meeting of the T.C. In presenting the budget, the convener, Bailie W. F. Russell, speaking of the doubling of the halfpenny stage, said that the introduction of that innovation had

brought the numbers buying penny tickets down by 50 per cent., while it sent up the number of half-penny passengers by 100 per cent., resulting in their carrying at the rate of 50 million extra passengers in the year. That had led to a considerable amount of congestion, and the overcrowding had probably led to a considerable increase in the number of accidents reported. That state of matters should improve every day now, as the 50 new cars in course of construction would be available for traffic very shortly. As regarded the current year's revenue and expenditure, they would require to watch things closely, because with reduced fares they were now sailing pretty near the wind. If trade kept good and traffic continued as it had done lately, he had no doubt they would be able to persevere with the extended halfpenny fare, and have a surplus to hand over to the common good as large as the present (£52,067). He did not anticipate any big extensions of route. A matter which had engaged the attention of the committee was the adoption of "pay-as-you-enter" cars, the development of which was being closely watched. Replying to a question, Bailie Russell stated that the local tramway strike cost the department £8,000, of which £6,000 was estimated as loss of revenue and £2,000 as other expenditure incurred in bringing the strike to an end. The coal strike involved an extra £5,000 in the price of coal, representing the purchase of between 10,000 and 11,000 tons.

Halifax.—The Tramways and Electricity Committee proposes to fit up 20 tramcars with top covers, at an estimated cost of £92 in respect of each car.

The borough engineer has been instructed to reconstruct the tramway track from Free School Lane to the terminus at Skircoat Green, at an estimated cost of of £2,890.

Keighley.—The Corporation last week decided to suspend the issue of penny return tickets on the tramways for a period of three months—except on Saturday afternoons and Sundays—and to divide the routes into six sections, halfpenny tickets being issued for any two consecutive sections. Ald. Midgley, in criticising the proposal, expressed fear that the tramway system would thus become a losing concern. He concluded, however, by intimating his intention to vote in its favour, and hoped the scheme would be a success, though he had his doubts.

Luton.—The T.C. has applied to the B. of T. for an extension of time until August 11th, 1914, for completing the works authorised by the Tramways Order, 1905.

South Africa.—At a meeting of the Blomfontein T.C. on June 7th, a resolution was adopted for a railless traction system, for which it has been decided to ask the authority of the ratepayers for £76,000.

Sunderland.—The annual report of the Corporation Tramways for the year ended March 31st last shows a total revenue from traffic of £67,871, compared with £58,889 for the preceding year. The total expenses were £38,955, and there was a gross profit of £29,278. Bank interest brings this up to £29,687. Of this £7,263 is absorbed by interest on capital, and £22,152 is carried to the appropriation account. The repayment of loans accounts for £9,880, £6,018 is devoted to renewals, and after meeting several small items, £5,000 is left for the relief of the rates. The average working expense per car-mile, including power, was 7·95d. During the year nearly 17 million passengers were carried, and 1½ million car-miles run.

At a meeting the other day in connection with the Sunderland District Electric Tramways, the Receiver (Mr. Chas. Eves) stated that it was of the utmost importance that a supply of new cars be provided at the earliest possible moment, as many of the present cars were obsolete and worn out. It was also mentioned that a portion of the track would have to be relaid at an estimated cost of £5,000 per mile.

TELEGRAPH and TELEPHONE NOTES.

The International Radio-Telegraphic Conference.—On Friday the delegates to the Conference were conveyed to Falmouth by special train as the guests of the General Post Office, and on Saturday they visited the great wireless Marconi station at Poldhu. Messages were received from Canada and the U.S.A., and dispatched to Italy, Spain and Portugal. The station is being greatly extended in generating capacity, and has been equipped with receiving apparatus, which was not formerly provided. On Sunday the delegates proceeded by steamer up the River Fal to Truro, whence they returned by train to London. On Tuesday the delegates were entertained at dinner by the President and the British delegates, on behalf of the Government.

Siberia.—The telegraph rate to the whole of Russia in Asia (Siberia and Bokhara) is now 4½d. per word, instead of 1s.

Uruguay.—The law establishing compulsory installation of radio-telegraphy on board all passenger vessels arriving at Uruguayan ports will come into operation on July 15th.

CONTRACTS OPEN and CLOSED.

OPEN.

Aberdare.—July 29th. (*a*) Additional plant at the generating station; (*b*) construction and equipment of tramways and railless system for the U.D.C. See "Official Notices" to-day.

Algeria.—ALGIERS.—The Chamber of Commerce of Algiers has been authorised to acquire for the ports of Algiers and Agha 24 portable electric cranes and four cranes worked by mechanical motors.

Ashton-under-Lyne.—July 30th. One 400-KW. motor-generator, one fuel economiser, two boiler feed pumps, coal elevator and conveyor and ash elevator, for the Corporation. See "Official Notices" to-day.

Australia.—WESTERN AUSTRALIA.—July 31st. Postmaster-General's Dept. Telegraph and telephone material. See "Official Notices" June 21st.

NEW SOUTH WALES.—August 28th. Common-battery and automatic switchboards, for Newton, Glebe and Balmain, for the Postmaster-General's department. See "Official Notices" to-day.

SOUTH AUSTRALIA.—October 1st. Telephone switchboards at Unley, Adelaide, for the Postmaster-General's department. See "Official Notices" to-day.

July 30th.—Steel rails and track fastenings for Municipal Tramways Trust, Adelaide. Mr. W. G. T. Goodman, chief engineer and general manager, Hackney Road, Adelaide.—*Australian Mining Standard.*

October 1st.—Telephone switchboards at Norwood, for the P.M.G.'s department. See "Official Notices" to-day.

October 22nd.—Telephone switchboard at Port Adelaide, for the P.M.G.'s Department. See "Official Notices" to-day.

VICTORIA.—October 22nd. Fourteen sections of common-battery multiple switchboard, for the P.M.G.'s department. See "Official Notices" to-day.

Austria.—PODGORZE.—Supply of a 250-H.P. engine and boiler plant, dynamos, leads, accumulators, and a switchboard for the projected extension of the municipal power station. Particulars at the Municipal Bureau.

Birkenhead.—July 8th. Two 750-KW. mixed-pressure steam turbines and D.C. generators, with condensing plant, &c., and nine superheaters and interconnecting steam pipes, for the Corporation. See "Official Notices" June 21st.

Bridgend.—July 9th. 325-KW. steam engine, alternator, and accessories, for the U.D.C. See "Official Notices" June 28th.

Brighton.—July 8th. Electric light installation, Stanford Road Schools, for the T.C. Messrs. T. Simpson & Son, 16, Ship Street, Brighton.

Carnarvon.—July 10th. Electric plant, wiring, &c., of the existing main and other workhouse premises and of the new infirmary buildings now in course of erection, for the B. of G. Mr. R. L. Jones, architect, 14, Market Street, Carnarvon.

Dublin.—July 18th. Transformers, for the Corporation. See "Official Notices" to-day.

Dundalk.—July 8th. Materials and stores for the U.D.C. Electricity Department. See "Official Notices" June 28th.

Dunfermline.—Electric lighting work for new Opera House, at Dunfermline. Mr. J. D. Swanston, architect, Kirkaldy.

Eccles.—July 15th. Slack (5,000 tons a year) for the Corporation electricity works for two years. Borough Electrical Engineer, Cawdor Street, Patricroft, Eccles.

Enniscorthy.—July 17th. Continuous-current motor, for the District Asylum. See "Official Notices" to-day.

Halifax.—July 9th. Coal (14,000 tons) for the Corporation electricity works. W. M. Rogerson, borough electrical engineer, Foundry Street. (Returnable deposit £5.)

London.—ISLINGTON.—July 24th. One 3,000-KW. steam turbo-alternator, with exciter, condensing plant, switchgear, piping, &c., for the B.C. See "Official Notices" June 14th.

July 22nd.—The Howard Smith Co., 33, Cornhill, London, E.C., are inviting tenders for the following:—One 350-KW. Rateau mixed-pressure turbine; one 350-KW. three-phase alternator; one surface condensing plant, together with electrically-driven pumps; two 30 ft. × 8 ft. 3 in. Lancashire boilers. Specifications and forms of tender on application.

H.M. OFFICE OF WORKS.—July 18th. Arc lamp carbons for two years. See "Official Notices" to-day.

July 9th.—The Commissioners of H.M. Works and Public Buildings are inviting tenders for the erection of Victoria New Telephone Exchange. Mr. J. Rutherford, 22, Carlisle Place, London, S.W.

Manchester.—July 9th. Corporation Tramways. (*a*) Tramcar trucks; and (*b*) Motors and controllers for tramcars. Mr. J. M. McElroy, general manager, 55, Piccadilly, Manchester.

July 16th.—Permanent way special track work for the Corporation Tramway Committee. Mr. J. M. McElroy, general manager, 55, Piccadilly. (Returnable deposit £2 2s.)

Newcastle-under-Lyme.—July 15th. 1,000 yd. of V.B. mains, for the Corporation. See "Official Notices" to-day.

New Zealand.—August 16th. Electric motor and induced fan for Christchurch City Council. Tenders to City Surveyor. Deposit £5. Copy of specification can be seen at Board of Trade Commercial Intelligence Department, London, E.C.

Nuneaton.—July 16th. One electrically-driven turbine type boiler feed pump, &c., for the Corporation. See "Official Notices" to-day.

Partick.—July 9th. Cables for the Burgh Electricity Department. See "Official Notices" to-day.

Pembroke.—July 15th. Electric lighting and other works in connection with 43 dwellings for the working classes at Beatty's Field, Ball's Bridge. Mr. S. L. R. Price, electrical engineer. Plans, &c., at Town Hall, Ball's Bridge, Pembroke, Co. Dublin. Tenders to Chairman of Housing Committee.

Rotherham.—July 8th. (*a*) Tramway stores and materials for a year for the T.C., and (*b*) Electricity meters. (*a*) Tramways manager; (*b*) Borough electrical engineer.

Salford.—July 25th. Electric light, telephone and fire alarm installations at the Union Infirmary, Hope, Pendleton, for the B.G. See "Official Notices" to-day.

South Africa.—PIETERMARITZBURG.—July 29th. One steam turbine with tandem generators, switchboard and condensing plant for the Corporation.—*South African Mining Journal.*

Spain.—July 31st. Electric lighting, for 15 years, of the town of Merida. Full particulars are given (in Spanish) in the *Gaceta*, which may be seen at the Commercial Intelligence Branch of the Board of Trade, E.C.

Tenders have lately been invited by the municipal authorities of Santa Otalla (province of Huelva) for the concession for the electric lighting of the town during a period of ten years.

Uruguay.—MONTE VIDEO.—July 13th. Tenders are called for the supply of 24 electric transporters for the port. Particulars, Ministry of Public Works.

Walthamstow.—July 19th. Extra-high-tension and low-tension cables, for the U.D.C. See "Official Notices" to-day.

CLOSED.

Accrington.—The Corporation has accepted the tender of Messrs. Glover for the supply of electric cables for Clayton-le-Moors, at £3,414.

Australia.—According to the *Australian Mining Standard*, the following contracts have been placed:—

Victorian railways:—

Cast-iron pipes and fittings for electric light station, £337.—The Atlas Co. of Engineers Pty., Ltd.
Truck material for electric street railway cars.—Noyes Bros. (Melbourne) Pty., Ltd.
8 miles electric wire, £113.—W. T. Henley's Telegraph Works Co., Ltd.
8 miles electric wire, £114.—Noyes Bros.
8 miles cable, at £24 10s. per mile.—British Insulated and Helsby Cables, Ltd.

MELBOURNE.—Postmaster-General's department:—

Five common-battery switchboards, 100 lines, at £57 each, £285.—J. Bartram & Son Pty., Ltd.
Jacks and plugs, £55.—British Insulated and Helsby Cables, Ltd.
40 tons hard-drawn copper wire, 300 lb. per mile, at £84 4s. per ton, £3,368.—British Insulated and Helsby Cables, Ltd.
32,000 porcelain insulators, pattern A, at 5·39d. each, £719; 120,000 porcelain insulators, pattern B, at 2·16d. each, £1,080; total contract, £1,799.—Theodore Zwicker & Co.
2,200 dry cells, at 2s. 4d. each, £257.—A. J. Sage & Co.
100 calling devices, £130.—Automatic Telephones (Australasia), Ltd.

Department of Home Affairs:—

Installation of electric light service at Fort Scratchley, Newcastle (N.S.W.), £369.—Joseph Bakewell, Newcastle.

SYDNEY.—Postmaster-General's department:—

17 miles 50 chains of cable, telegraph, lead-covered, paper-insulated screened, 25 conductors, 50 lb. per mile, in 220-yard lengths, at £277 per mile.—Siemens Bros. Dynamo Works, Ltd.

ADELAIDE.—Postmaster-General's department:—

Relays, duplex repeaters.—British Insulated and Helsby Cables, Ltd.

Birkenhead.—The Tramways Committee has accepted the tender of Messrs. Siemens Bros. Dynamo Works, Ltd., London, for the supply of six cars (with bodies built by Messrs. Hurst, Nelson & Co., Ltd.,) each seating 60 passengers, for the sum of £4,374.

Belfast.—The B.C. Electricity Department accepted the following tenders:—

Whipp & Bourne.—Extra H.T. switchgear.
Bertram Thomas.—Switchboard extensions.
Johnson & Phillips, Ltd.—Car-shed panels.

Bristol.—The B. of G. has accepted the tender of Messrs. Collings Bishop, Ltd., Cardiff, for electric light at Stapleton Workhouse, at £890. Fourteen firms tendered, the highest quotation being £1,648.

The Docks Committee of the T.C. on Monday accepted the tender of Messrs. Johnson & Phillips, Ltd., for cable for the shed cranes, and that of Messrs. Siemens Bros. & Co., for crane connection boxes.

Bray.—The following tenders were received by th U.D.C. for the electricity works:—

Section (1).—100-KW. alternator and Diesel engine.

Diesel Engine Co. (86-KW. set)	£1,734
Mirrlees, Bickerton & Day (accepted) (including Phœnix alternator	1,811
Willans & Robinson	1,997
Diesel Engine Co. (135-KW. set)	2,263
Cole, Marchant & Morley	2,377
British Westinghouse Co. (118-KW. set)	2,544

Section (2).—Overhead travelling crane.

Herbert Morris & Co.	(accepted) £128	J. Spencer	£140
J. Smith	199	Carrick & Ritchie	160
Pickerings, Ltd.	182	J. Williams	150
S. Whiteley	183	Holt & Willets	150
Vaughan & Son	184	Marshall Fleming	170
J. Carrick	184	J. Thompson	192

Chester-le-Street.—The B. of G. has accepted the tender of Mr. G. H. Armstrong for motor machinery for the Workhouse laundry, at £56.

Coventry.—The Management Committee of the Coventry and Warwickshire Hospital has accepted the tender of Messrs. Waygoods, Ltd., for an automatic electric lift.

Eastbourne.—A contract for elevators for the Corporation electricity works has been placed with Messrs. Ed. Bennis & Co.

Erith.—The U.D.C. has accepted the tender of Messrs. Allen & Simmonds, Ltd., for repairing No. 4 engine at the electricity works, at £182.

Grimsby.—The Borough Education Committee has accepted the tender of Messrs. E. H. Buck & Co., Ltd., of Manchester, for electric light fittings at Victoria Street Schools, at £83.

Haslingden.—The Committee of the Bury Road Baptist Church has placed the order for the electric lighting of the church and the electric blowing of the organ with Mr. A. M. Cramp, of Haslingden.

Hull.—The Tramways Committee of the T.C. has accepted the tender of Messrs. Bolling & Lowe for steel tramway rails (manufactured by the Phœnix Co., of Hamburg), at £7,969.

Japan.—The *Daily News* states that an important Japanese contract has been obtained by Messrs. Dick, Kerr & Co., Ltd., from a Japanese hydro-electric power company. It is described as probably the largest order for water-driven alternators which has been placed in this country. The order covers six alternators, each of 7,775 K.V.A. capacity.

Keadby.—The Great Central Railway Co. has accepted the tender of Sir Wm. Arrol & Co., Ltd., of Glasgow, for a lifting bridge, electrically operated, over the river Trent at Keadby.

Leyton.—The U.D.C. has received the following tenders for the supply of 75 double concentric cable:—

Aubert Grenier & Co.	£1,230	Johnson & Phillips, Ltd.	£1,180
Brit. Ins. and Helsby Cables	1,133	Siemens Bros. & Co.	1,131
Elec. Eng. and Equip. Co.	1,102	**Standard Cable Manufacturing Co., Ltd.** (accepted)	1,052
General Electric Co., Ltd.	1,247	R. R. Todd	1,060
W. T. Henley's Telegraph Works Co.	1,130	Union Cable Co.	1,201
W. T. Glover & Co.	1,100	Western Electric Co.	1,350

The tender of Bertram Thomas has been accepted, at £105, for the supply of an additional feeder panel to the switchboard.

Llandudno.—The U.D.C. has accepted the tender of Messrs. Thomas Parry & Co., of Mold, for from 4,000 to 5,000 tons of slack for the Electricity Works, at 9s. 9d. per ton.

London.—L.C.C.—The Fire Brigade Committee received the following tenders for electric light wiring and fitting at Shooter's Hill fire station:—

A. Hawkins & Sons	(accepted) £171	Barlow Bros. & Co.	193
Pinching & Walton	180	J. Bryden & Sons	252

The Horsfall Destructor Co., Ltd., having intimated its inability to enter into the necessary contract for the provision of sand crushing and drying plant, at £651, fresh tenders were invited as below:—

Mechan & Sons, Ltd.	(accepted) £1,211
Edgar Allen & Co., Ltd.	1,289

The Highways Committee received the following tenders for guards for shafting, &c., at the Greenwich generating station:—

Rownson, Drew & Clydesdale, Ltd.	(accepted) £374
St. Pancras Ironworks Co., Ltd.	388
Hunter & English, Ltd.	546

A contract has been entered into with the Morgan Crucible Co., Ltd., for brushes for electrical machinery for the year 1912-13.

BERMONDSEY.—The tender of Messrs. Myers, Rose & Co., Ltd., has been accepted by the B.C. for a 12 months' supply of Shipley peas coal at 16s. 3d. per ton, subject to the firm agreeing to supply 3,000 tons, the Council to have the right to order 20 per cent. up or down on that quantity.

WOOLWICH.—The following tenders have been accepted by the B.C.:—

C. A. Parsons & Co.—Renewing commutator to dynamo of No. 3 turbo set at Woolwich Works, £98.
Yorkshire Copper Works, Ltd.—Renewal of condenser tubes to Nos. 6 and 7 engines at Plumstead Works, £116.
Willans & Robinson, Ltd.—One 1,500-KW. turbo-alternator, £4,782.
Siemens Bros. Dynamo Works Co., Ltd.—Sub-station switchgear, £805.
Ferranti, Ltd.—Sub-station switchgear, £205.

ST. PANCRAS.—The B.C. Electricity and Public Lighting Committee reports having received the following tenders for two

1,000-KW. motor-generators for the Tavistock Place sub-station and the King's Road generating station:—

Crompton & Co.	£4,696
General Electric Co.	5,102
Electric Construction Co.	5,372
Bruce Peebles & Co.	5,410
Brush Electrical Engineering Co.	5,600
Siemens Bros. & Co.	6,348
Dick, Kerr & Co.	6,516
British Westinghouse Co.	7,026
British Westinghouse Co. (alternative rotary at 500 revs.)	6,510
British Westinghouse Co. (alternative rotary at 378 revs.)	6,900
British Thomson-Houston Co.	7,800

The chief electrical engineer advised the Committee that having regard to the amount of floor space occupied, the interchangeability of plant and the elasticity and simplicity in operation of the set offered by Messrs. Bruce Peebles & Co., he considered their offer the most suitable for the Council's purposes. This offer includes £50 for a D.C. starter and also £50 for tests on site, but he states that as four of the firm's machines are already in use at the Council's electricity stations, the test on site will not be necessary, nor is the D.C. starter required, so that their offer will be reduced to £5,310, and he recommends that the firm's tender at this price should be accepted. He further points out that all the tenderers except Messrs. Bruce Peebles ask for modifications either in the arbitration clause or in the general conditions. For these reasons the Committee states, although the offer in question is not the lowest received, it agrees with the engineer's proposal that it should be accepted.

The tender of Messrs. J. H. Beattie & Co. has been accepted for annual supplies of the following coals to the Electricity Department:—20,000 tons Mansfield best slack, 14s. 2d. per ton; 2,000 tons Staveley large slack, 15s. 2d.; 8,000 to 9,000 tons Nuneaton D.S. nuts, 15s. 2d.

Luton.—Messrs. E. Bennis & Co., Ltd., have received an order for mechanical stokers and self-cleaning compressed-air furnaces for the borough electricity works.

Margate.—The T.C. received the following tenders for electrically-driven sewage pumps:—

Rees Roturbo Manufacturing Co., Ltd.	(accepted) £295
Sun Patent Evaporator Co., Ltd.	262
Marshall, Osborne & Co.	281 or 282
British Electric Plant Co., Ltd.	308 or 330

Plymouth.—The tender of Cory Bros. & Co., Ltd., for 8,000 tons of coal, at 14s. 6d. per ton (1s. per ton above present contract) was accepted by the Electricity Committee.

Ramsbottom.—The U.D.C. has accepted the tender of Messrs. Dawson & Manfield, of Manchester, for a refuse destructor and steam disinfector, at £3,800.

Salford.—The following tenders have been accepted by the T.C.:—

J. Lomax, Kendal & Co., Ltd.—Installation of electric light at Nashville Street School, £138.
Walter Scott, Ltd.—700 tons Sandberg steel tramway rails, £7 15s. per ton.
John Smith (Keighley), Ltd.—10-ton engine room travelling crane at electricity works, £290.
Browett, Lindley & Co.—Reboring three high-pressure cylinders and making and fitting complete three new high-pressure pistons fitted with restrained piston rings, £50.

The following tenders have also been accepted for an annual supply and delivery of high-speed electric motors:—

General Electric Co. (approximate value of contract), £563.
Horace Green & Co., £219.
Electric Construction Co., Ltd., £31.
Phœnix Dynamo Manufacturing Co., Ltd., £49.

Southampton.—The tender of the Union Cable Co., Ltd., has been accepted by the T.C., at £134, for the supply of 1,600 yd. of high-tension cable. Three other tenders were received at prices ranging from that accepted to £182. The tender of Messrs. Myers, Rose & Co., Ltd., has also been accepted for a supply of 500 tons of Pinxton coal at 20s. 9d. per ton for the generating station; as has the tender of Messrs. Dinham, Fawcus & Co., Ltd., for 250 tons of Bolsover coal at 20s. 11d. per ton. For the supply of 1,120 yd. of 1 in. cable and 190 yd. of 1·5 in. cable, the tender of Messrs. William Rickard, Ltd., has been accepted, at £706 and £64, respectively.

Wallasey (Cheshire).—The contract for mechanical stokers and furnaces for the borough electricity station at Liscard has been given to Messrs. Ed. Bennis & Co., Ltd.

Walthamstow.—The U.D.C. has accepted the tender of the British Thomson Houston Co., Ltd., at £411, for a low-tension switchboard.

Worcester.—The Infirmary Committee has accepted the tender of Mr. H. J. Harding, of Worcester, for electric lighting work at the infirmary, at £125, and for telephonic installation, at £27.

York.—The B. of G. has accepted the tender of Messrs. T. H. Cabey, Ltd., of South Shields, for materials for extending the telephones and fire alarms at the Workhouse, at £73.

FORTHCOMING EVENTS.

Association of Engineers-in-Charge.—Saturday, July 25th. At 7.30 p.m. At the St. Bride's Institute, E.C. Discussion on "Condensers: Their Construction and Efficiency."

NOTES.

Census of Production.—The second census of production, under the Census of Production Act, 1906, will be taken in 1913 in respect of production carried on in the present year. The schedules to be issued to manufacturers and others for the purpose of this census cover, in the main, the same ground as those for the first census. The instructions have been simplified, and the majority of the schedules have been reduced from eight pages to four pages of somewhat larger size. In certain schedules, particulars are now required of the total make of important semi-manufactured products such as yarns, pig-iron, steel ingots, &c., whether further worked up by the makers or not. By arrangement with the Home Office, the particulars of the numbers of persons employed will also serve as the ordinary return required for 1912 under Sec. 130 of the Factory Act, and manufacturers will thus be saved the trouble of making two separate returns. Small firms employing not more than five persons besides the employer, on making a declaration to that effect on the schedules issued to them, will be exempted from the requirement to furnish returns. At the present time, the schedules are being issued in draft to Chambers of Commerce and Trade Associations in order to afford them an opportunity for the consideration of the details of the information required before these are finally settled. The schedules on which manufacturers will be required to make their returns will not be sent out until the beginning of next year.

Legal.—FITTON *v.* MUIR.—An application was made at the Manchester County Court on Tuesday, before Judge Mellor, K.C., by Mr. Brocklehurst, on behalf of John Fitton, of Victor Street, Lower Broughton. Messrs. Muir were the defendants. The case arose out of an unusual event which occurred at Strangeways, Manchester, at the works of Wm. Muir & Co., engineers and machine tool makers, and the application was made under the Workmen's Compensation Act. Plaintiff's case was that on March 4th he was following his employment as a crane driver for Messrs. Muir, when he stumbled, and his left hand touched an unprotected "live" wire attached to the crane. He received a shock to the left hand and arm, and they were numbed for about half-an-hour afterwards. The arm had been flung violently backward when the shock occurred, and it caught against the crane. Later he found he was unable to lift the arm, but he continued working under great difficulties until he went to the manager and reported the accident. This was on March 8th, and the manager told him he ought to have reported the matter earlier. That, Mr. Brocklehurst said, he understood, was something on which the defence relied for their answer to the claim for compensation at the rate of 13s. a week. Another point of the defence (said Mr. Brocklehurst) was that the locomotor ataxy which came on subsequently was due not to the accident but to natural causes. In that connection he mentioned that the plaintiff was an old Rugby footballer, who had played 20 years ago for the Broughton Club. He had always been in very good health, and it was a remarkable thing that he should contract locomotor ataxy almost immediately after the accident took place. There had been no trace of it before, and as to the health of his family, his father died when he was 74, and his mother was older, and still living.

Plaintiff in his evidence denied Mr. Wingate Saul's suggestion that his arm had been wasting and getting weaker before the accident. It was all right until the accident.

Judgment was eventually given for the defendants.

The First A.C. Railless Trolley.—The first alternating-current railless trolley in the world is being shown in working order on a tar macadam road, by the Gesellschaft für Gleislose Bahnen Max Schliemann & Co., at the Electrical Exhibition of Leipzig. This is an electric 'bus travelling on a strip of tar macadam 100 ft. in length, which has been rolled on an existing uneven stone pavement 6 cm. in thickness, after scratching out the joints as far down as possible. The 'bus is operated by a 1,000-volt single-phase commutator motor of 15 H.P. output, at 1,200 R.P.M. and 50 cycles, started and controlled by shifting the brushes. The motor drives the rear axle through a double cardan shaft and a worm gear of 10 : 1, and the rear wheels by an elastic clutch. The form of current, the voltage and the use of a repulsion motor constitute decided novelties in this connection. The rubber tires are guaranteed for 20,000 km., but 40,000 km. have been reached in actual operation, corresponding to a cost of ½d. per km. The vehicle is lighted by metal-filament lamps. The speed is 20 km. per hour, the average consumption being ½ KW.-hour per kilometre.

London Labour Troubles.—A meeting of waterside and other manufacturers in the London district was held on Wednesday at the London Chamber of Commerce Building in Oxford Court, to consider the position of London manufacturers owing to the lightermen's strike.

Will.—Mr. John Dodd, late chairman of Platt Bros. and Co., Ltd., of Oldham, left £228,100 gross and £222,380 net personalty

Institution Notes.—INSTITUTION OF ELECTRICAL ENGINEERS.—The annual conversazione of the Institution of Electrical Engineers was held on Thursday evening, June 27th, at the Natural History Museum, South Kensington. The guests, who included a number of the delegates to the International Radio-Telegraphic Conference, numbered about 1,250, and were received by the president, Dr. S. Z. de Ferranti, and Mrs. de Ferranti, and the Council of the Institution. Among those present were:—Lord Justice Buckley, Sir John Gavey, Col. Sir T. H. Holditch, Sir Walter Howell, Prof. Jackson (president, American I.E.E.), Sir Alexander Kennedy, Major W. A. J. O'Meara, Sir Henry Tanner, Sir Cecil Trevor, Dr. J. H. T. Tudsbery, Sir Edward White, and many other distinguished guests. The string band of the Royal Engineers performed in the Central Hall, and the Royal Windsor Glee Singers in the Shell Gallery, and the function passed off with the usual success.

INSTITUTION OF MECHANICAL ENGINEERS.—The balloting list of new members to be submitted to the general meeting on the 30th inst., we should think, breaks the record; it contains the names of no fewer than 206 candidates for admission or transfer—35 to the class of Members, 117 to that of Associates, and 54 to that of Graduates. Is it the spectre of examination that looms in the background of the near future?

Annual Outings.—The staffs of the Urban Electric Supply Co., at Dartmouth and Newton, held their annual outing on June 20th, the party, numbering upwards of 30, journeying by motor from Newton to Bovey Tracey, where breakfast was partaken of. The run was then continued to Chagford, where a halt was made, and upon arrival at Okehampton, dinner was provided at the Plume of Feathers, Mr. G. E. Smith, the engineer and manager, occupying the chair. Subsequently a cricket match was played between the two staffs on the Okehampton cricket ground, through the kind permission of the local club, the Newtonians winning by two wickets and eight runs. Later the journey was resumed to Crediton, where tea was served. On the return journey the party passed through Exeter, and remained for a while at Chudleigh for supper.

The Fuller Electrical and Manufacturing Co., Walthamstow, had their annual outing on Saturday, June 29th, when a party of 29 went to Clacton-on-Sea. After a morning bathe in the sea, the company were early ready for the repast, which was served at 12 o'clock at the Clifton Restaurant. Tea was served in the grounds attached to the restaurant.

The International Electric Co., of Kilburn, held their annual outing on June 29th. Close upon a hundred of the employés and staff took part. Yarmouth was reached soon after ten o'clock. The party assembled for lunch at the Granville Hotel, with Mr. H. R. Roose in the chair. The usual toasts were given, and the continued success of the I.E.C. was referred to by the chairman. A short musical programme served to while away the time during a shower.

Astor Gift to "Mackay-Bennett" Crew.—According to the New York *Times*, Capt. Larnder, of the cable steamer *Mackay-Bennett*, which recovered a large number of bodies of victims of the *Titanic* disaster, including that of Col. John Jacob Astor, has received from Mrs. Astor, his widow, and Vincent Astor, his son, as proof of their appreciation of the work of the crew of the *Mackay-Bennett*, $2,000 for distribution in gratuities to those who assisted in any way in the work of recovery.

Forced Vibrations.—An interesting letter from Prof. J. Perry appeared in *Nature* last week, on the subject of forced vibrations, pointing out that the amplitudes of forced vibrations are greatest when the forcing influences are in tune with the natural vibrations only if there is no damping; when damping or corresponding loss of energy takes place, the statement is not correct. It is an important matter for persons concerned with telephony or wireless telegraphy; for instance, the tuning of the antenna should be readjusted when the sender becomes the receiver. Prof. Perry gives various examples, worked out, to illustrate his point.

Veritys' Derbyshire Climbing Club.—On Saturday last the members of the above club trekked to Edale, and, under the direction of Chief Guides Ride, Landon and Knowles, ascended Back Tor, climbed over the Ridge to Mam Tor, ascended the chain, and then went over the Winnats, descending to the Speedwell Caves; there they took boat and covered the underground waterway to the Main Cavern, where the source of the wells was negotiated. After the subterranean exploration, the party dined at the George Hotel, Castleton. In the evening a visit was paid to Peveril of the Peak's Castle, and then to Hope, where the party joined the homeward train, after a very enjoyable climb.

Fatality.—An inquest was held at Willington Quay-on-Tyne on June 28th respecting the death of David Carrot, 31, who was killed at the Willington Foundry. Ralph Stevens, an electrician, stated that the deceased was employed as a labourer and spare craneman. On June 26th he learned that the deceased had fallen from an electrically driven crane on to a "live" wire which was carrying an alternating current at 440 volts. The current could be cut off, he explained to the Factory Inspector, by drawing out the fuses controlling the crane supply, and also by the switch which controlled the whole of the machinery in the works. Ralph Paton said he and deceased were assisting in erecting a new crane. It was necessary to move the existing crane, and Carrot went up to do this. Witness saw him move the crane and leave the cage. The next moment someone shouted an order for the fuses to be drawn. Witness looked up and saw Carrot standing on a girder, grasping the electric wire with his hand. The fuses were drawn, and deceased at once fell to the ground, and fractured his skull. He died immediately afterwards. Other evidence having been given, the jury returned a verdict to the effect that deceased was killed by a fall from an electric travelling crane, and recommended that a separate switch should be provided to control the crane alone.

Coal Cutters on Rails.—It frequently occurs in colliery practice that where mechanical coal cutters are adopted, these machines are mounted so as to run on rails which have to be laid on the floor of the working place. These tracks are necessarily of a temporary nature, and in some situations the use of rails has proved productive of considerable trouble owing to the fact that a large amount of time is taken in laying the rails and many of the joints between the various sections prove bad. The result of this is that as the cutter passes over these joints it shows a very great tendency to come off the rails, and the difficulty of getting heavy machines of this nature back again in a more or less confined space can easily be imagined. Cases have been known where up to two hours of valuable time have been absorbed in doing work of this description. Another point with regard to this method of working is that as these rails are very often laid in a slipshod manner, the undercut is very likely to be irregular. In some cases it has been known to vary from 4 ft. 6 in. to 6 ft., and this varying depth of undercut seriously interferes with clean and regular working. The use of skids obviates all this trouble, as there are no rails to lay and there is, of course, nothing for the machine to slip off. The depth of the undercut is regulated in an easy and sure manner by a side rail which runs along the props, and in addition to these advantages, it is found that the machine is not so liable to slew as the type which runs on a rail track. For these reasons a skid possesses advantages which should be considered by the colliery engineer.

Appointments Vacant.—Two prime cost clerks, for the Hackney B.C. Electricity Department (£90 and £105 respectively); station superintendent for the City Electricity Department, Carlisle (£120). See our advertisement pages to-day.

Electricity Works Table.—We regret that the undertaking of the Rawtenstall Corporation, which also supplies Bacup with electricity in bulk, was inadvertently omitted from our list. On the other hand, the Folkestone District E.L. and P. Co. should be deleted, having been absorbed by the Folkestone Electricity Supply Co., Ltd.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—At a smoking concert held on Friday last, the staff of the Hull Corporation electricity department presented MR. H. BELL, the city electrical engineer, whose marriage was recently announced in our columns, with a set of silver spoons in case, suitably inscribed. The presentation was made by Mr. J. F. Magoris, the chief assistant electrical engineer, who referred to the high esteem in which Mr. Bell was held, and the good fellowship existing throughout the department. Mr. Bell suitably responded, and his health was toasted with musical honours. An excellent programme of music and song was rendered during the evening.

The Kingston-on-Thames T.C. has increased the salary of MR. P. C. SIMPSON, of the electricity works staff, from £3 to £3 10s. per week, with a further increase to £4 on April 1st, 1913. He is to have charge, under the electrical engineer, of the work both outside and inside the central station.

MR. WINTERHALDER, second assistant engineer and mains superintendent at the Kingston-on-Thames Corporation Electricity Works, has secured an appointment at Rio de Janeiro.

Blackburn General Purposes Committee has had under consideration the proposal to increase the salary of MR. P. P. WHEELWRIGHT, borough electrical engineer, from £500 to £700, by increments of £50 a year. The Labour members offered strenuous opposition, but the recommendation was carried. The opposition, however, is to be renewed at the next open Council meeting.

On June 29th MR. S. R. RYMER, assistant to Mr. Percy Murray, of the Newcastle-upon-Tyne Electric Supply Co., Ltd., was married to Miss Cissie Dotchin, of Newcastle. A number of his colleagues and other friends were present.

MR. A. W. BARHAM, station superintendent, Carlisle, has been unanimously appointed to the position of chief assistant at Watford U.D.C. electricity works. MR. J. ELLIS, of Llanrwst, has been appointed junior shift engineer.

General.—At a general meeting of the Royal Institution on Monday, MR. J. S. HIGHFIELD was elected a member.

MR. FRANKLIN PUNGA has established himself as consulting engineer in Liége (Avenue Rogier 30).

It is announced in the *Times* that MAJOR H. G. K. WAIT, R.E., has been appointed Chief Instructor in Electricity at the School of Military Engineering, Chatham, vice Major Dumaresq.

The *Times* New York correspondent states that at a dinner of the American Institute of Electrical Engineers in Boston, the Institute presented MR. GEORGE WESTINGHOUSE with the Edison Medal "for meritorious achievement in connection with the development of the alternating-current system for light and power."

MR. WILLIAM OLIVER, B.Sc., A.M.Inst.C.E., of Messrs. Bruce Peebles & Co., Ltd., was married on Wednesday last week, in St. Giles' Cathedral, Edinburgh, to Miss Kate Wilson Somerville Shaw. Mr. Oliver was recently presented by his colleagues with a handsome silver salver and silver cigarette box, both suitably inscribed, to commemorate the event.

MR. JOHN E. RAWORTH, of 28, Broadway, Westminster, S.W., announces that he has just acquired the business, established in the year 1871 by the late Mr. Newnham Browne, chartered patent agent, and carried on by him and his successors at the Old Mansion House, 73, Cheapside, E.C. Mr. Raworth is retaining the offices in Cheapside, and will conduct them as a City branch of his business, under the management of Mr. C. L. Perry, who was for many years with Mr. Newnham Browne, and has had over 25 years' experience in patent and trade mark matters.

On the afternoon of Friday last, MR. H. CHAS. GOVER bade farewell to the head office staff of the Edison & Swan United Electric Light Co., Ltd., with which he has been since its inception; indeed, he was connected with the business prior to the amalgamation which established the company whose name is now a household word. The whole of the managers and staff of the offices, depôts and works of the company, united in showing their respect and esteem by presenting Mr. Gover with a massive chest of cutlery and sterling silver fruit dishes. The presentation was made by Mr. John Cooper, the accountant of the company, in the presence of the head office staff. In replying, Mr. Gover, who, in company with all present, was much affected, expressed his great appreciation of the gift which he said he knew was merely the manifestation of the warm feeling which underlay it. At such a time one's feelings were almost too deep and too strong to find expression in words. When he looked round the room and saw that picture, the group of those who had been his colleagues and who had given him so willingly their assistance in all his duties, he felt it was a picture he could never forget. He had never dreamed of so spontaneous an expression of regret at his leaving the firm. He had known most of those in the room for some years, and during that time the staff of the company had gone on steadily attending to their work and their duties. There had been perfect harmony between everyone, and very few difficulties had cropped up, but the best way to go through life was to keep your eyes towards the sun of the future and not to look back to any shadows which might have existed in the past. Mr. Gover indulged in some interesting reflections on the position of wage-earners and the general condition of the country to-day as compared with those of the year 1848, when he was an apprentice.

Obituary.—An inquest was held at St. Margaret's, near Dover, last week, into the death of MR. W. F. NOSWORTHY, a retired superintendent electrician of the Western Telegraph Co., who disappeared from Folkestone a few days previously. Death was shown to be due to morphia poisoning. Deceased had been in the habit of taking morphia for malaria and rheumatism contracted in South America.

We regret to record the death of MR. W. S. B. MCLAREN, M.P. which occurred on Saturday last, at the age of 59 years. The deceased gentleman had been for the greater part of his lifetime very actively engaged in connection with mining, iron, textile and other industries, and among other companies with which he was associated were the Electric Construction Co., Ltd., and the Madras Electric Tramways (1904), Ltd., of both of which he was chairman.

NEW COMPANIES REGISTERED.

Lemington Glass Works, Ltd. (122,562).—This company was registered on June 12th, with a capital of £25,000 in £1 shares (15,000 6 per cent. cumulative preference), to carry on the business of manufacturers of, and dealers in, glassware for lamps, and other apparatus for use in connection with electric and other illumination, and with the generation, distribution, accumulation, supply and employment of electricity, &c., and to adopt an agreement with Robertson Electric Lamps, Ltd. The subscribers (with 100 preference shares each) are:—H. Hirst, 67, Queen Victoria Street, E.C., electrical engineer; J. Fraser, 31, Copthal Avenue, E.C., chartered accountant. Private company. The number of directors is not to be less than two or more than five; the first are H. Hirst and J. Fraser; qualification, 100 shares; remuneration as fixed by the company. Registered office, 31, Copthal Avenue, E.C.

United Carborundum and Electrite Works, Ltd. (122,569).—This company was registered on June 12th, with a capital of £100 in £1 shares, to take over the business of the Vincit Co., Ltd., to acquire and work the agency for Great Britain and the Colonies for the sale of "Carborundum" and "Electrite" products manufactured, produced, or sold by the Vienna Carborundum Co., to manufacture and sell appliances for use in the engine building, acetylene gas plant, agricultural implement, anchor, armour plate, and bicycle manufacturing and various other trades, &c. The subscribers (with one share each) are:—S. Whitman, 25, Gledhow Gardens, S.W., company director; W. T. Batteo, 179, Queen Victoria Street, E.C., company director. Private company. Table "A" mainly applies. S. Whitman signs as a director. Registered office, 70, Queen Victoria Street, E.C.

R. F. Syndicate, Ltd. (122,722).—This company was registered on June 20th, with a capital of £2,000 in £1 shares, to acquire patents and inventions connected with incandescent electric lamps, gas mantles and burners, &c., and to adopt an agreement with J. T. Robin and others. The subscribers (with one share each) are:—W. J. Willis, 35, Frederick Road, Chingford, clerk; H. Douglas, 15, East Bank, Stamford Hill, N., clerk; E. Mackenzie, Foxholme, Barron Road, Streatham, S.W., clerk; J. T. Robin, 38, Tooting Bec Gardens, Streatham, S.W., manufacturer. Private company. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first. Registered by Ashurst, Morris, Crisp & Co., 17, Throgmorton Avenue, E.C.

North Berwick and District Electric Light and Power Co., Ltd. (8,298).—This company was registered in Edinburgh on June 15th, with capital £7,500 in £1 shares, to carry on business of an electric light and power company in North Berwick, &c. The subscribers are:—E. A. Schafer, Marbyknowe, North Berwick, professor of physiology, 100 shares; F. Kinloch, Shipka Lodge, North Berwick, J.P., 100 shares; P. Farquharson, Westwood, North Berwick, house agent, 100 shares; J. McK. Brown, Wardville, North Berwick, chartered accountant, 1 share: W. T. Perves, 13, Albany Street, Edinburgh, civil engineer, 1 share; J. E. Ivens, Hillside, Hanger Lane, Ealing, London, W., civil engineer, 100 shares; K. A. Scott Moncrieff, Salisbury House, London Wall, London, E.C., 100 shares. The number of directors is not to be less than three or more than nine; the first are Prof. Schafer, F. Kinloch, P. Farquharson, J. E. Ivens and K. A. Scott Moncrieff; qualification, £100. Registered office, 9, East Road, North Berwick.

Listowel Light and Power Co., Ltd. (3 852).—This company was registered in Dublin on June 18th, with a capital of £2,000 in £1 shares, to carry on at Listowel the business of an electric supply company in all its branches. The subscribers are:—J. Macanley, Listowel, agent, 25 shares; P. Corridan, Listowel, grocer and vintner, 25 shares; Wm. McElligott, Listowel, auctioneer, 25 shares; Daniel J. Flavin, Listowel, chairman U.D.C., 5 shares; P. Bocen, Listowel, secondary teacher, 25 shares: John McKenna, Listowel, merchant, 15 shares; Thos. J. Walsh, Listowel, draper, 25 shares; E. J. Long, Limerick, leather merchant, 25 shares; S. J. Cantwell, 6, Fleet Street, Dublin, engineer, 25 shares. Private company. The number of directors is not to be less than three or more than seven; the first are J. Macanley, Wm. M. McElligott, E. J. Long, P. Bocen, P. Corridan, T. J. Walsh and G. J. Cantwell; qualification, £25; remuneration as fixed by the company. Registered office, Power House, Listowel, Co. Kerry.

T. Wilkinson (Arnside), Ltd. (122,064).—This company was registered on June 18th, with a capital of £3,000 in £1 shares, to take over the business of an electrical engineer carried on by T. Wilkinson at Arnside, Westmorland. The subscribers (with one share each) are:—O. W. Porritt, Torside, Helmshore, woollen manufacturer; W. F. Crowther, Union Bank Chambers, Bolton, chartered accountant; T. Wilkinson, Braeside, Arnside, Westmorland, electrical engineer. Private company. The number of directors is not to be less than three or more than five; the first are O. W. Porritt, W. F. Crowther and T. Wilkinson; qualification, £100; remuneration as fixed by the company. Solicitor, J. G. Priestwood, Arnside, Westmorland. Registered by Jordan & Sons, Ltd., 116-117, Chancery Lane, W.C.

Canadian-British Engineering Co., Ltd. (122,775).—Registered June 24th, by Slaughter & May, 18, Austin Friars, E.C. Capital £205,000 in 200,000 7 per cent. preferred ordinary shares of £1 each, and 100,000 deferred shares of 1s. each, to carry on in Canada or elsewhere, the business of consulting, civil, naval, mining, railway, electric, gas, mechanical, and general engineers, manufacturers of and dealers in agricultural and mining implements and machinery, iron, steel, and other metal manufacturers and workers, founders, smelters, machinists, tin-plate workers, manufacturers of all kinds of metal goods, contractors for the erection of engineering works, and to adopt an agreement with Key Engineering Co., Ltd. The signatories (with one share each) are:—A. Corbett, 18, Austin Friars, E.C., solicitor; H. Pettitt, 18, Austin Friars, E.C., solicitor; L. H. Hiscock, 34, Lonsdale Square, Barnsbury, N., clerk; P. J. Hellis, 3, Merthyr Terrace, Castlenau, Barnes, S.W., secretary; D. Avory, 18, Austin Friars, E.C., solicitor; A. C. C. Hutchinson, 13, The Boltons, S.W., gentleman; R. Hill, 129, Deacon Road, Willesden Green, N.W., clerk. Minimum cash subscription, seven shares. The first directors (to number not less than three or more than seven) are C. L. Agnew, The Pole, Northwick, Cheshire; W. H. Patchell, M.I.C.E., Caxton House, Westminster; L. Andrews, M.I.C.E., 4, Queen Victoria Street, E.C.; and W. A. Martin, 2, Toronto Street, Toronto, Ontario (managing director in Canada); qualification, £250; remuneration, £150 per annum chairman £50 extra).

Colne Valley Electric Supply Co., Ltd. (122,867).—This company was registered on June 28th, with a capital of £200 in £1 shares, to carry on the business of an electric supply company in all its branches. The subscribers are:—H. W. Couzens, 50, Queen Anne's Gate, S.W., consulting engineer, 25 shares; N. Gunn, 65, Hillier Road, Clapham Common, S.W., law clerk, 1 share; F. A. Hayward, 37, Wandle Road, Upper Tooting, S.W., engineer's assistant, 1 share; F. C. Judd, 6, Devereux Road, New Wandsworth, S.W., clerk, 1 share; H. Perkins, Osborne House, Bartholomew Villas, Kentish Town, N.W., accountant, 1 share; G. F. Baker, 141, Bennerley Road, New Wandsworth, clerk, 1 share: H. H. Vardon, 25, Victoria Street, S.W., clerk, 1 share. Minimum cash subscription 20 per cent. of the shares offered to the public. The number of directors is not to be less than two or more than five; the first are H. W. Couzens and A. L. Radford; qualification, 25 shares. Solicitors, Chas. Rogers, Sons & Abbott, 13, Victoria Street, S.W. Registered office, 50, Queen Anne's Gate, Westminster.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

M. E. Robinson & Co., Ltd. (121,625).—Particulars of £700 and £350 second debentures, created May 7th, 1912, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amounts being now issued. Property charged: The company's property, present and future, including uncalled capital. No trustees.

Electrical Advertising Co., Ltd. (108,465).—Debenture dated May 23rd, 1912, to secure £132 12s. 2d. Property charged: The company's undertaking and property, present and future, including uncalled capital, subject to prior charge for £700. Holders: London and Provincial Bank, Ltd.

Penrith Electric Supply Co., Ltd. (99,764).—Mortgage dated June 3rd, 1912, to secure all moneys due or to become due from the company to PARR'S Bank, Ltd., charged on land and building in Friar Street, Penrith.

Ceara Tramway, Light and Power Co., Ltd. (119,030).—Trust deed, dated May 24th, 1912, to secure £400,000 debenture stock, charged on the company's undertaking and property, present and future, including uncalled capital. Trustees: British and International Investment Trust, Ltd., 6, Austin Friars, E.C.

Brilliant Arc Lamp and Engineering Co., Ltd. (119,811).—Particulars of £200 debentures, created June 4th, 1912, filed pursuant to Section 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

John Tinsley, Ltd. (91,206).—Issue on June 5th, 1912, of £700 debentures, part of a series of which particulars have already been filed.

Electromobile Co., Ltd. (75,139).—Issue on June 12th, 1912, of £159 15s. debentures, part of a series of which particulars have already been filed.

Newcastle and District Electric Lighting Co., Ltd. (28,022c).—Particulars of £150,000 second debentures and a premium of 5 per cent., created March 19th, and secured by trust deed dated June 6th, 1912, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: Freehold land and generating station at the Close, Newcastle-on-Tyne, and Lemington and Close Banks, and company's other assets, present and future, except uncalled capital. Trustees: United States Debenture Corporation, Ltd.

A memorandum of satisfaction in full on June 4th, 1912, of debentures dated April 30th, 1907, securing £100,000, has been filed.

Engineering and Arc Lamps, Ltd. (116,030).—Issue on June 21st, 1912, of £500 debentures, part of a series of which particulars have already been filed.

Corona Lamp Works, Ltd. (116,527).—Particulars of £5,000 prior lien depentures created June 11th, 1912, filed pursuant to Section 93 (3) of the Companies' (Consolidation) Act, 1908, the amount of the present issue being £500. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

South American Light and Power Co., Ltd. (74,446).—A memorandum of satisfaction in full on June 19th, 1912, of trust deed dated March 11th, 1903, securing £50,000 5 per cent. debentures and 5 per cent. premium, has been filed.

Penrith Electric Supply Co., Ltd. (99,764).—A memorandum of satisfaction in full on May 17th, 1912, of mortgage dated September 1st, 1909, securing all moneys due from company to bankers, has been filed.

CITY NOTES.

Kalgoorlie Electric Tramways, Ltd. (W.A.).

THE directors report that the gross receipts for the year ended December 31st, 1911, amounted to £41,472, as compared with £43,004 for the previous year, while the net profits earned were £14,250, against £15,199 for 1910. The directors regret that owing to the decline in the mining industry in Kalgoorlie and the absence of any fresh discoveries of importance in the district, the returns continue to decrease. The gold production for the year has not been very materially lessened, but the introduction of labour-saving appliances has, no doubt, had its effect on the number of men employed, and this in turn has adversely affected trade in the district. A considerable amount of labour agitation has also tended to disturb local conditions, all of which is reflected in the decreased traffics. The earnings for the current year show a further decline as compared with those of 1911, and the directors greatly regret that they have no option but to suspend payment of the full interest on the "B" debenture stock, which accordingly will receive interest for the half-year to June 30th, 1912, at the rate of 3 per cent. instead of 6 per cent. per annum. The directors have done, and are doing, all they can to protect the interests of the shareholders and debenture-holders, but, obviously, it is impossible for them to create traffics, when, as in this case, the traffics depend entirely on the prosperity of the town. It was hoped that the Government depôts for the trans-Continental railway would be erected at Kalgoorlie, but latest advices are to the effect that the engineers recommend placing them some miles away; should this course be decided upon no great benefit could result to Kalgoorlie as the workmen would be compelled to live at the depôts instead of in the town. The directors understand that great efforts are being made to induce the Government to erect the depôts in or near to Kalgoorlie. The engineer reports that during the year the cars travelled 621,086 car-miles, as against 624,790 car-miles in 1910, and carried 2,694,936 passengers as against 2,798,216. The earnings per car-mile in 1911 were 15·98d., as against 16·45d. in 1910, with an expense of 9·97d. per car-mile in 1911, as against 10·13d. in 1910. The expenses per cent of earnings in 1911 were 62·39, as against 61·57 per cent. in 1910. The company's rolling stock, plant, tracks and overhead lines have been kept in a satisfactory state of repair during the year. In the meantime every effort is being made to reduce the working expenses. A further amount of £5,709 of "A" debenture stock was purchased for redemption, in July, 1911, making the total stock redeemed to December 31st last £30,431. By the operation of the sinking fund, a further amount of stock will shortly be redeemed, reducing the amount of "A" debenture stock outstanding to approximately £64,000. The board record their appreciation of the work done by the whole of the staff in Western Australia during the year.

Chilian Electric Tramway and Light Co., Ltd.—The report states (according to the *Financier*) that the accounts for the year 1911 show, including £11,553 brought forward, and after placing £60,000 to renewals reserve account and £7,000 to insurance suspense account, an available balance of £80,531, out of which a dividend of 6 per cent. on the preference shares in respect of the year 1911, amounting to £39,000, has been declared. A further dividend in respect of the arrears of interest on these shares to December 31st, 1900, has also been declared, amounting to £30,175, leaving £11,357 to be carried forward.

Mexican Light and Power Co., Ltd.—The directors have declared a dividend of 1 per cent. for the quarter ended June 30th on the ordinary shares.

Shawinigan Water and Power Co.—The directors have declared a dividend of 1¼ per cent. for the quarter to June 30th.

Globe Telegraph and Trust Co., Ltd.

PRESIDING at this company's meeting, held on Tuesday last week, at Electra House, E.C., Sir J. Wolfe Barry, K.C.B., after referring to the death of the Marquis of Tweeddale and the election of Viscount Midleton to the vacancy thus created, said that the receipts were not quite so much as in the previous year, when they were the largest ever received. The total receipts for the 12 months, after deducting working expenses, amounted to £210,472 as against £211,858, or a decrease of £1,386, making with the balance brought forward £239,004. They had already distributed three quarterly dividends of 3s. per share on the ordinary shares and three interim dividends at the fixed rate of 6 per cent. per annum to the preference shareholders. Those payments had absorbed £131,085, and the directors now recommended the payment of a final dividend on the ordinary shares of 6s. per share net, which, with previous distributions, made the total dividend for the year on those shares 6 per cent., being at the same rate as last year. The amount required for this final dividend together with that of the final dividend of 3s. per share on the preference shares, absorbed £79,922, leaving a balance of £27,996 to be carried forward to the next account. Turning to the company's return from its investments the Chairman said that the dividends from the Anglo-American Telegraph Co., Ltd., showed a slight decrease. There was also a slight decrease in the receipts from their holding in the Direct United States Cable Co. of £123, due to the fact that they had disposed of some of their holding in the company. The receipts, however, were somewhat larger than they otherwise would have been, owing to the fact that the company, in conformity with the arrangements made with the Western Union Co., had decided to close their accounts and pay their final dividend three months earlier than usual. They sold those shares at a very much higher rate than they paid for them, and the profit on the transaction—£2,384—had gone to reduce the item in the balance-sheet under the heading, differences of securities realised. Their receipts from the Mackay companies had considerably increased, owing to their having increased their holding. There was a slight diminution in their receipts from the Submarine Cables Trust, owing to the fact that seven of their certificates were drawn last year. The largest falling off occurred in the case of the shares which they held in the Telegraph Construction and Maintenance Co. Last year their attention was drawn to the fact that their increased receipts on that occasion were largely due to the fact that the company had increased their dividend from 17½ per cent. to 20 per cent. This year their dividend had again dropped to 17½ per cent., which accounted for a loss under that heading of £1,105. The result was a total decrease of £2,122; but against this there was first the increased dividend from their holding in the Mackay companies of £736 and the increase in the balance brought forward of £851. Those two items together amounted to £1,587, so that the total decrease was only £535. Taking all the circumstances into consideration, he thought they would agree, especially in view of the fact that the ordinary shareholders were receiving a dividend at the rate of 6 per cent. as last year, that it was a very satisfactory state of affairs. In conclusion, he said it would interest the shareholders to know that the present value of their securities, taking the lowest market prices, showed an increase over the original cost of over £300,000.

SIR J. DENISON-PENDER, K.C.M.G., seconded the motion, and the report was adopted.

Standard-Waygood, Ltd., Australia.—This company, which about three years ago took over the businesses of the Standard Electric Elevator Co. and Waygood, Ltd., appears to be doing a very successful business. According to an Australian exchange, it made a net profit for the year ended March 31st of £19,972, making a total, with £10,022 brought forward, of £29,994. The profits show an increase of £2,223. An interim dividend for six months, at the rate of 10 per cent. per annum, absorbed £4,345. The directors recommend a final dividend at the rate of 10 per cent., amounting to £5,000, and a bonus of 10 per cent. for the year, amounting to £10,000, leaving £10,647 to be carried forward. The premiums on the second and third issues of capital were not brought into the account, but were used to extinguish goodwill. There is to be a new issue of shares (25,000) to shareholders at par, in the proportion of one new share to every four shares held.

Trowbridge Electric Supply Co., Ltd.—The first annual meeting was held last week, Mr. J. H. Blake presiding. The directors reported that, for the portion of the year under review up to December last, the profit and loss account showed a balance of £54. After placing £20 as a nucleus of a depreciation fund, the directors recommended that the full dividend of 5 per cent. per annum be paid upon the cumulative preference shares, and that £2 be carried to reserve for outstanding expenses, leaving £9 to be carried forward.

Eastern Telegraph Co., Ltd.—The directors have declared a dividend at the rate of 3½ per cent. per annum, less income-tax, on the preference stock for the quarter to June 30th, and a first quarterly interim dividend of 1¼ per cent. on the ordinary stock, free of income-tax, in respect of profits for the year ending December 31st, 1912.

Calcutta Electric Supply Corporation, Ltd.—The number of units delivered to consumers, during the five weeks ended May 31st, 1912, amounted to 1,257,608, compared with 1,105,607 units in the corresponding five weeks of 1911.

J. G. White & Co., Ltd.

THE annual meeting was held on Thursday last week at 9, Cloak Lane, E.C., Lord Arthur Butler presiding.

The CHAIRMAN, in proposing the adoption of the report (see ELEC. REV., Vol. 70, page 1014), said he was sure they would share the satisfaction of the directors at the results of the past year. When they met last year, the chairman (Mr. J. G. White), who he regretted had been detained in New York, and was unable to be with them that day, stated that the outlook was encouraging. They would find these anticipations had been fulfilled, and that the net profit for the year amounted to £87,107, which, although £4,360 less than in the record year of 1911, was far greater than in any other year in their history, and enabled them, after making substantial provisions for reserves, to recommend the same dividends as last year. The cash, loans at call, and short-time loans, in other words, their quick assets, amounted to £186,746, or nearly equal to their total capital, and more than three times the total creditors. Regarding the investments, he could only say that the directors believed them to be very conservatively valued, and this course they considered prudent to adopt, although the securities were earning a very handsome return on their balance-sheet valuation. The prices received on sale of securities from the investment account during the past year confirmed the valuation, as the profits from such sales had been substantial, and no security or investment had been sold at a price below its balance-sheet valuation. The amount of investment account, £196,162, was approximately £46,000 higher than a year ago. Naturally, with the increased resources of the company from the building up of its reserves, and the increased financial business done, the amount of this account had grown, and would undoubtedly continue to grow. The dividend returned on investments amounted to 6½ per cent. on the present valuation. This was a little smaller than during the preceding year, but still he thought they would agree that it was a very good interest rate. The amount of £10,837 shown against contract retentions and works in progress did not in anyway represent the volume of works in progress; as a matter of fact, this figure covered only retentions held for uncompleted work, and should be combined with sundry debtors, &c., in one item of £72,358, to show the current working capital in the contracting portion of the company's business. This debtor item was very substantially larger than the creditor item on the other side of the account. Plant, instruments and stock of materials had been written back to £1 nominal valuation, following their usual custom. The purchase of business or goodwill was written off last year, as they would remember, and stood at the nominal value of £1. The debit side of the balance-sheet required no further comment, except perhaps to call attention to the substantial reserve accounts, amounting together to £115,000. The profit and loss balance available for allocation amounted to £83,212. The profit and loss accounts showed that the net profit on their contracts, engineering and financial work amounted to £87,246, after ample allowances for contingencies. The percentages to staff and directors who were members of staff, in accordance with agreements, amounted to £11,707, and were contingent salaries, which he trusted they would agree had been earned, in view of the substantial profits shown and the substantial dividends they were about to recommend. Regarding the distribution of profits, they had first set aside £25,000 to add to the dividend equalisation reserve fund, making this reserve now £40,000. In other words, nearly one-third of the profits earned was being retained for the present in the business. The balance permitted them to recommend a dividend (together with the interim dividend already paid) amounting to 12 per cent. on the whole of the preferred shares, and also 12 per cent. on the ordinary shares, and a further extra dividend of 10s. per share, or a total of 62 per cent, upon the ordinary shares. The amount carried forward would be increased from £19,813 to £21,212. As to the outlook for the future, he could say that business was progressing favourably, and generally the conditions in their line appeared to be improving. There was considerable new work in sight, and they looked forward to continued prosperity. This did not mean that they expected in every year to be able to pay as large dividends on the ordinary shares as on this occasion, but it meant that the company should continue to increase its business and strengthen its position, and maintain a generally satisfactory rate of return to its shareholders.

MR. JOHN B. WHITE seconded the motion and the report was adopted.

Lyme Regis Electric Light and Power Co., Ltd

THE annual meeting of the company was held at Dorset on Saturday, when it was decided to sell the undertaking to a company which is now being formed for the purpose of supplying electricity in practically all the chief towns of the county of Dorset. Mr. A. J. Woodroffe presided.

The annual report showed a profit of £372 on the year's working, and the directors recommended the payment of a dividend of 4 per cent. (free of income-tax), the balance of £194 to be carried to the depreciation and reserve account, making a total reserve of £487. The private consumers, numbering 70, took 13,945 units during the 12 months. Another 11 consumers were now being connected up, with 103 extra lights. The profits on the consumers' department had increased from £224 odd in 1911, to £352.

The directors had to report the death in February last of the company's engineer, Mr. Henry Clements. Mr. F. Cheshire, who had charge of the station during the late Mr. Clement's illness, has been engaged as the new engineer.

The CHAIRMAN dealt with the proposal to sell the company to the County of Dorset Electric Supply Co., Ltd. An offer had been made by this combine to purchase the Lyme Regis Co. at a sum of £5,500 cash, and although they might feel sorry to see the concern passing into other hands, the directors considered there were many advantages to be gained by merging it into the larger company, which should be able to work it even more cheaply than they had been able to, by having a central station. They would also be able to deal in larger quantities, and, therefore, cheaper, and there would be a supervising engineer to properly inspect the various sub-stations. Again, the shares of the combine would, of course, have a Stock Exchange quotation, which was hardly ever the case with a small company. The County of Dorset Co. was being formed for the purpose of supplying electricity for public and private use in the county of Dorset, and proposed to commence business in the following towns: Dorchester, Sherborne, Blandford, Wimborne, Swanage and Lyme Regis, and statutory powers had already been granted in the first five towns. The share capital was £75,000 divided into 75,000 ordinary shares of £1 each, the whole of which would be offered at par. Competitive tenders had been obtained for the plant and mains for the towns other than Lyme, and the lowest complying with the specifications had been provisionally accepted.

A report on the entire scheme had been obtained from Mr. W. C. C. Hawtayne, consulting engineer.

The CHAIRMAN said that to his mind the Corporation were certainly the people who ought to have taken it over, but it had been offered to them, and they had declined it. Shareholders would be paid out at par, but it was hoped that they would keep their money in the new company.

Stock Exchange Notices.—The Committee has appointed a special settling day as under:—

Friday, July 5th.—New York Telephone Co.—Scrip, fully and partly paid, for a further issue of £1,750,000 4½ per cent. first and general mortgage 30-year bonds (London issue).

And ordered the under-mentioned securities to be quoted in the Official List:—

Aron Electricity Meter, Ltd.—£100,000 5 per cent. first mortgage convertible debentures of £100 each (Nos. 1 to 1,000.)

Marconi's Wireless Telegraph Co., Ltd.—Further issue of 250,000 ordinary shares of £1 each, fully paid (Nos. 750,001 to 1,000,000.)

New York Telephone Co.—Scrip, partly paid, for a further issue of £1,750,000 4½ per cent. first and general mortgage 30-year bonds (London issue).

Tramways (M.E.T.) Omnibus Co., Ltd.—Fully-paid scrip for £100,000 4½ per cent. guaranteed debenture stock.

French Edison Co.—The report of the Compagnie Continentale Edison states that the gross receipts, including interest and profits on investments, amounted to £175,000 in 1911, as compared with £154,000 in the preceding year. As net profits the accounts show the sum of £152,000, as against £134,000 in 1910, on an ordinary share capital of £400,000. It is proposed to pay a dividend of £4 4s. per share on the 20,000 ordinary shares, being the same rate as in 1910, and to pay £3 per share on the 14,000 profit shares. The increased profits from the supply of electricity afford proof of the extension of the supply in Paris, which is still undertaken by the Union des Secteurs. As from 1914, however, the Edison Co. will only be interested in the business through its holding of 20,000 shares in the Compagnie de Distribution. These shares could be divided among the shareholders, and the company could go into liquidation, were it not for the fact that this course is not permitted by the statutes, which provide that the company has to be continued until 1932 in the interest of the profit shares. In these circumstances, the directors are seeking other fields of industrial activity, but this is no longer an easy matter in the lighting branch. The company has already participated in the formation of the Société Hydro-Electrique de Lyon, which is to utilise the water-power of the Fier, Haute-Savoye, for the supply of electricity to Lyons, and negotiations in regard to other enterprises are reported to be in progress.

Cape Town Consolidated Tramways and Land Co., Ltd.—The directors' report states that after charging London administration expenses and trustees' fees, and after crediting accrued interest and transfer fees, a balance of £1,412 is shown to the debit of profit and loss account for the year 1911, making the total to the debit of profit and loss account £4,627, to be carried forward. No dividends have been declared by the subsidiary companies during the past year. While it has been possible to work the tramway at a small profit, the estate companies have been worked at a loss. This condition must of necessity continue until there is a larger settled population. The operation of the Camps Bay tramways during the year shows considerable improvement, the number of passengers carried being 78,161 over the preceding year, with a profit on working of £1,274, compared with a loss of £375. From what can be seen of the current year's working this improvement will be more than maintained.

Charles Churchill & Co., Ltd.—The report for the year ended March 31st last states that the trading profit after due provision for depreciation is £22,973. The directors propose to place to reserve £4,300 and to pay a dividend of 20 per cent. on the ordinary shares, less £1,500 interim dividend already paid, to place an additional £6,500 to reserve account, and to carry forward £2,766.

Automatic Telephone Manufacturing Co., Ltd.—The directors have declared the dividend on the 6 per cent. cumulative preference shares.

Sunderland District Electric Tramways, Ltd.

ON 22th ult., at Winchester House, E.C., Mr. Charles Eves, the Receiver, presided over a meeting of the 5 per cent. prior lien bondholders and the debenture-holders, for the purpose of considering a scheme for the future conduct of the concern.

The CHAIRMAN, in proposing a resolution adopting the scheme, said it provided for the re-arrangement of the capital of the existing company, instead of the formation of a new company. The prior lien bonds would be paid off with interest to date, and in their place new prior lien bonds would be created for £300,000. Of this amount £20,000 had to be issued, and arrangements had been made for guaranteeing the same. The first mortgage debenture-holders were asked to give up 25 per cent. of their present holding, and to accept in lieu thereof first mortgage bonds. They were also asked to accept those income bonds in settlement of the two and a half years' unpaid interest which would have accrued up to the end of the present month. The total issue of first income bonds would amount to about £72,000. The holders of the second charge debentures were also being asked to accept those income bonds in part settlement of their debentures. The interest on the first income bonds would be payable out of any profits available after the payment of debenture interest, and the setting aside of £500 per annum towards the redemption of the prior lien bonds. The amount required to meet prior lien bond interest, and interest on the reduced amount of first mortgage debentures, would then be £7,100, which, together with the £500 for redemption, made a total annual fixed charge of £7,600, which was well within the present earnings of the company. The company had always been handicapped for want of adequate working capital with which to provide a large and up-to-date service of cars, and to keep the line in an efficient state of repair. It was considered that under the present scheme sufficient capital would be provided to meet those requirements. It was of the utmost importance that a supply of new cars should be provided at the earliest possible moment, the present cars, excepting some few, being either obsolete or worn out. He had found it necessary during the last few months to discontinue the running of some of the older cars, which were no longer in a safe condition, and the service had had to be reduced accordingly. With regard to the track, a large portion ran through colliery workings, and was, consequently, subject to continual subsidence. During the two years of his management, they had spent a considerable sum in repairs, and he thought he might say that the line was now in a better condition than it had been for some years past. A certain portion of the track would, however, have to be relaid, and that would involve an expenditure of about £5,000 per mile. The district was a growing one, and with an efficient service of cars the traffic receipts should gradually increase. If the scheme met with the approval of that meeting it would have to be submitted to the Court for confirmation.

MR. R. TAYLER seconded the resolution.

Replying to a question, the CHAIRMAN said the guarantors were prepared to take the new bonds at 90 per cent. They would be redeemable at par 40 years hence. He had no doubt that if any of the present shareholders would like to take up some portion of the bonds an arrangement might be made, but he would not have been able to come before them with the scheme unless he had first got somebody to guarantee to take the whole issue.

The resolution was carried unanimously.

Singapore Electric Tramways, Ltd.

THE directors' report states that the accounts for 1911 show an excess of revenue over expenditure of £32,970, the profit for the year, after charging debenture interest, depreciation and royalty paid, £5,055. Tramway revenue shows an increase of £2,053; 344,155 more passengers were carried, although 75,402 fewer car-miles were run. The number of passengers carried per car-mile was 6·42, as against 6·04 in 1910. The revenue from lighting and power again shows a very satisfactory increase, being 36 per cent. higher than 1910, and 88 per cent. higher than 1909. Notwithstanding that the company has during the past three years made a net profit of £7,034, after providing for debenture interest, depreciation and royalty, thus reducing the debit on profit and loss account to £9,183, the possibility of the payment of regular dividends on the present capital is rather remote. In the opinion of the board the tramway undertaking stands at too high a figure in the books of the company, or, in other words, the capitalisation of the company is much in excess of the value of the assets, and when the dividend stage, to which the progress of the company justifies the board in looking forward, is reached, the rate of distribution on the present capital would necessarily be very low. The directors recently instructed the general manager, Mr. J. H. Garratt, to make a valuation of the undertaking and plant, and this valuation Mr. Garratt reports by cable to be £425,000. In view of this the board recommends that the 400,000 shares be reduced from £1 to 7s. 6d. each.

SIR FRANK A. SWETTENHAM presided on 25th ult. over the annual general meeting of the company held at the offices, 19, St. Swithin's Lane, E.C.

In moving the adoption of the above report, he said the debenture liability had been reduced by £3,000, debentures to that amount having been bought by the company. The tramway undertaking stood at £689,055, as against £699,328 in the accounts for 1910. There had been small additions on capital account for buildings, for a stone-breaking plant which would reduce the cost to the company of metal for road-making, and a small installation in connection with a direct supply of current to Government House. In regard to depreciation, they had not written down the plant at the full rates suggested by the general manager, but this year the better working results had enabled them to increase the figure by about £900, to £12,477, which was a very substantial amount. The accounts again showed an appreciable increase in receipts, both from the tramway and from the sale of energy for lighting and power, and, as in the past two years, they were again in a position to point to the improvement in the net result of the working of the undertaking. The year 1909 was the first period in which they were able, after deduction of debenture interest, depreciation and royalty, to show a surplus, the profit for that year appearing in the accounts as £134. In 1910 the balance was again on the right side, showing a surplus of £1,843, and for last year in respect of the accounts now in their hands, the profit was increased to £3,318. The expenses for power and maintenance and repairs were higher than those for the preceding year. The increase in the case of power was due to fuel and to slight increases under other heads. As regarded maintenance and repairs, the expenditure under permanent way exceeded the figure for the previous year by about £2,000. Each year it was necessary to repair or relay considerable lengths of the track, and in order to minimise as much as possible the costs under this head in future years, more solid work was being put in than was provided for in the original tramway contract. The traffic expenses were lower by £425. The ratio of total expenses in Singapore to receipts was 51·17 per cent. as against 52·88 per cent. for the previous year, or a decrease of 1·71 per cent., making a very low percentage. Electric lighting was becoming increasingly popular in Singapore and he had no doubt that this popularity would continue. The company continued very fortunate in regard to its staff. For the satisfactory results to which he had referred they were indebted to the able management of their general manager, Mr. J. H. Garratt, and those working under his direction. For some time past they had been able at the general meetings favourably to compare the years under review with the preceding years, and he thought they might now regard the business of the company as established on a firm foundation, and this brought him to a convenient time for referring to the two resolutions which were included in the notice convening the meeting. Although the company had reached the stage when it could meet all its charges out of revenue, and show a small profit, the directors were of opinion that, if the company was to take its place with dividend-paying commercial concerns, the shareholders should consent to a reduction of the share capital. Although depreciation amounting in all to £64,854 had been written off the cost of the tramway undertaking, the latter still stood in the books of the company at over £689,000. Feeling that this capitalisation was much in excess of the value of the company's assets, they recently instructed the general manager to make a valuation of the company's undertaking and plant, and this valuation the general manager put at £425,000. They, therefore, recommended that the shares of the company be reduced from £1 to 7s. 6d. each, which would have the effect of writing off £250,000, or five-eighths of the share capital. They believed that this course would be in the interests of all the shareholders, and it would undoubtedly bring the company nearer the dividend-paying stage. The second resolution had reference to the borrowing powers of the company. As they were aware, the original debenture debt was £350,000, and the borrowing powers under the articles of association admitted of borrowing up to the nominal amount of the capital. If, therefore, the resolution reducing the capital to £150,000 was passed, it would be necessary to alter the borrowing powers to a fixed sum, which they put at "£350,000" instead of the expression, "the nominal amount of the capital."

SIR CHARLES PETRIE, J.P., seconded the motion, and the report was adopted.

At a subsequent meeting, the resolutions reducing the capital were adopted.

German Electrical Companies.

THE *Elektra Gesellschaft, of Dresden*, realised gross profits of £39,000 in 1911, as compared with £23,000 in the previous year. After placing £8,000 to depreciation, as against £2,500 in 1910, and making other allocations, the accounts show net profits of £29,000, as contrasted with £18,000. It is intended to make a distribution of 6 per cent. on the share capital of £225,000, this comparing with 5½ per cent. in 1910

The accounts of the *Continentale Ges. für Elektrische Unternehmungen, of Nuremberg*, indicate that £14,000 has been placed to the reserve fund for the renewal and capital redemption of works under the company's management, and £4,100 to the legal reserve fund. Having made these and other appropriations, the net profits are returned at £84,000 for 1911, as against £76,000 in 1910. The directors propose the payment of a dividend of 5 per cent., as contrasted with 4½ per cent. in the preceding year.

The *Ges. für Elektrotechnische Unternehmungen, of Munich*, which has been unable to pay any dividends for several years past, reports a fresh loss for 1911, which increases the total deficit to £49,000, or nearly one-half of the ordinary share capital of £100,000. Apart from owning and working supply stations, the company became interested in an Austrian railway enterprise, in which heavy losses have been incurred. It is now proposed to reconstruct the company by reducing the share capital in the proportion of five shares to one, and to ask the shareholders to make an additional payment of 25 per cent. on the reduced shares, which would then be converted into 6 per cent. cumulative preference shares.

The report of the *Elektrizitats Ges. vorm. W. Lahmeyer & Co.*, whose dividend announcement of 5 per cent. for 1911 has previously been reported, states that all the works and companies under the management of the company experienced a favourable development during the year, and the prospects for the new financial year appeared to be satisfactory. The latter statement was confirmed at the recent general meeting, when it was mentioned that the degree of employment at the Felten & Guilleaume works, in which the company holds shares of £600,000, was also very good. It will be remembered that the Lahmeyer company exchanged shares of about £1,050,000 for new shares in the Bank for Electrical Enterprises of Zurich two years ago.

The *Deutsche Pope Lampen, A. G., of Aix-la-Chapelle*, in reporting on the second year's operations, states that only four months could be regarded as the actual working period, as the greater part of the machinery was only delivered in the course of the year. The business organisation had stood the test and had rendered possible the rapid introduction of the Pope lamp, whilst the oversea trade had developed and would presumably further advance. On the other hand, the movement in prices had been in a downward direction. The accounts for 1911 show, including the loss in the year of formation, a total deficiency of £4,400 to be carried forward. Owing to the uncertainty regarding the course of prices the company has been induced to take up other manufactures, partly on its own account and partly in agreement with firms engaged in allied branches of trade.

Aluminium Corporation, Ltd.

MR. S. G. BIBBY, deputy-chairman, presided on Monday, last week, at Salisbury House, E.C., over the second ordinary general meeting of the above company.

The CHAIRMAN, in moving the adoption of the report (see ELEC. REV., Vol. 70, page 1014), dealt briefly with the items in the balance-sheet, and said that when the present company was formed the directors rather anticipated a time of stress, and to assist them in this it was arranged that the preference stock should not become cumulative for the first two years. The wisdom of this view had been amply demonstrated by the unforeseen difficulties which had been experienced during the past year. First, it was found necessary to render the inside of the walls of the Eigiau dam with cement; this, though not a very costly operation in itself, created a difficulty which was of real importance, for it called for the complete emptying of the lake at a period of the year when the rainfall was at its lowest, and consequently held up the manufacturing operations until it was too late for the works to make up the leeway. In fact, in the earlier part of 1911 there seemed every prospect of the actual running expenses of the company being covered. Serious difficulties were also experienced in the transport of material to and from the works, and to meet these, a wharf had to be erected on the river at Dolgarrog, a steamboat purchased, a short railway line constructed, and extra stores erected. Then the price of aluminium in the market was depressed to such an extent that it was quite impossible for any newcomer like themselves to make any contracts which would show a reasonable profit, while further difficulty was experienced in the carbon factory, which naturally made the task of showing a satisfactory result almost impossible. The actual loss on the manufacture could not be described as a heavy one, and was caused by the fact that for months they had to keep a staff quite out of proportion to their production of metal. During the year very serious difficulties were experienced in connection with the housing of their workmen, there being no cottages in the neighbourhood of the works. This difficulty had been got over by their chairman coming to the rescue and providing funds, which enabled a builder to erect some 20 model cottages immediately at the gates of the works. Later in the year, when they were able to get into active work, the known deficiencies of the carbon works erected at Wallsend by the old company became acute, and once again the chairman came forward with the financial support necessary to lift the company out of a very difficult and unsatisfactory position. There could be no question that the consolidation of their carbon and metallurgic manufacture at Dolgarrog would be of the very greatest service, but, in addition to that, the funds that Mr. Clark had provided would enable the company to erect a regenerative gas furnace of the most modern type, which would place the company upon a basis for the economical manufacture of the metal equal to that held by the best of the other manufacturers. Had they desired, a great deal of the expenditure which had appeared under the heading of profit and loss account could have been treated in other ways, but the directors had laid down a rigid line that every section of the works should be maintained in the very highest state of efficiency out of revenue, and they therefore had not thought it necessary this year to make any provision for depreciation; they felt sure that if any of the shareholders cared to visit and inspect the works they would cordially agree with the statement which he made, that the various sections of the plant were being taken care of in the most careful manner possible. With regard to the future, he had pleasure in confirming the statement made in the report that there appeared to be every prospect of the present improved market price of aluminium being maintained, and they would forgive him if he did not enlarge upon this statement. Since the close of the accounts the works had steadily maintained their output, and while they did not anticipate reaching during the present year the fullest tonnage that it was possible for their machines to deal with, they were justified in saying by the tonnage obtained in the first half of this year that the total would be a satisfactory one, giving every promise of a full output next year. The question of costs in the manufacture of such a highly scientific product as aluminium was of the greatest importance, and this item was receiving the directors' most careful consideration. The bauxite mines, in France, had been very carefully developed in such a way as to give the maximum output at a minimum cost; in fact, he might say that no other company had a bauxite deposit which they could work as economically as they were doing, and when certain storage accommodation (which was at present in hand) had been erected at the port of shipment, they anticipated that this, the first step in their process, would be placed in a position second to none. At the bauxite refining works, Hebburn-on-Tyne, of which the company held five-sixths of the shares, manufacture had now been in full swing for a sufficient time to bring the plant into balance, and it was anticipated that the close of this year would show that works put in a sound and satisfactory position. At Wallsend, the works which at present existed had always been an incubus to the company, and would be closed in the early future, and the old metallurgical works had been let upon lease, so that another relief had been afforded the company. At Dolgarrog they were now in a very satisfactory position; the old difficulties of transport, caused by the geographical position of the works, had been overcome, the company's raw materials and manufactured goods being dealt with at the port of Conway, and conveyed up the River Conway to the wharf at the company's works by their own steamer, where the raw materials were handled on an electric tramway right into the works. The power house plant had given the utmost satisfaction, additional storage accommodation had been provided, and active operations were at present in progress for the building of the new carbon works, while accommodation for their workmen had been provided. In fact, when certain work at present in hand was completed, they would be able to claim that they had a model installation capable of turning out metal of the highest grade in sufficient quantities, under the new conditions, to give a return which would at least justify the reconstruction.

MR. ROBERTSON LAWSON seconded the motion.

MR. HUGHES asked why three of the directors had resigned; how much aluminium had been actually made; what value the board attached to the Wallsend site; and how much the chairman had advanced to the company. He also called the attention of the board to a report in a French paper of a new invention for the brazing and soldering of aluminium.

MR. F. E. ANDREWS remarked that the report proved the wisdom of the advice he gave that the company should have accepted the offer to sell their assets to another company instead of reconstructing.

The CHAIRMAN said that when Mr. Clark, the chairman, advanced the money to the company he made it a stipulation that two directors should retire from the board, while Mr. Stennett retired, for reasons of his own. The chairman had advanced £20,000 to the company and held second debentures for the loan. The question of what aluminium they had made would, he hoped, be answered satisfactorily in next year's report. He could not say what value they had put on the Wallsend works. If they had accepted the offer to buy the assets of the company the shareholders would have got nothing.

The report was adopted.

Bombay Electric Supply and Tramways Co., Ltd.

SIR CHARLES OLLIVANT (chairman) presided on Tuesday last week at the offices of the Electrical Federation, Kingsway, over the annual meeting of this company.

In moving the adoption of the report (see ELECTRICAL REVIEW, Vol. 70, page 1016), the CHAIRMAN first referred with regret to the death of Sir Edward Sassoon, who was the chairman of the company from its formation. His colleagues had done him the honour of electing him as chairman, probably because of his intimate acquaintance with Bombay, and it was his firm belief that the successful administration of the company's undertaking would be to the convenience and interest of the citizens of Bombay, whose interests he from long association had at heart. The board were glad to be able to present a record of steady and continuous progress. They had increased their gross revenue by £19,900, as compared with the previous year, at an increased cost of only £3,600. Whilst, therefore, their gross revenue had increased in the proportion of 9·11 per cent., their net revenue had increased in the proportion of 16·88 per cent. This would be regarded as satisfactory, particularly as evidence of the attention directed to the control of the working expenses. The net receipts aggregated £113,580, and after deducting the interest on the debenture debt, amounting to £35,718, there remained £77,861, to which had to be added £11,748 brought forward, making an available total of £89,610. The preference dividend paid in August, with the accrued interest to December, absorbed £35,993, leaving £53,616, which the directors recommended should be dealt with by placing £16,700 to the depreciation account, £6,531 to the sinking fund, £5,000 to the general reserve fund, and by appropriating £18,000 to the payment of a dividend at the rate of 3 per cent. per annum, thus leaving £7,385 to be carried forward to next year. The revenue from the tramways branch of the undertaking had again shown considerable extension, which was helped by the influx of visitors into Bombay in connection with the Royal visit. The traffic for the first five months of the present year continued to show a satisfactory growth. No extensions had been made to their lines but the subject of further extensions, which must greatly depend on local developments and corresponding street improvements, was receiving careful attention. The working of the two-car trains had proved of such value in dealing with the rush hours' traffic, that it had been

decided further to augment their number by the provision this year of eight new trains, and it was intended that these should be delivered by November 1st. The proportion of operating expenses to the gross revenue of the tramway branch worked out at 47 per cent., which was exceedingly favourable. It was the more satisfactory in view of the low scale of fares in force in Bombay, averaging only 1 anna, or 1d. per passenger carried. The total receipts from the electricity supply section of the business amounted to £76,530, against £66,920 for the previous year, while the working expenses were £48,264, compared with £43,897; so that the increased revenue of £9,608 had been earned by an additional expenditure of £4,366. In connection with this expenditure it must be borne in mind that the transfer of the load from the old Wari Bunder power station to the new Kussara station took place in the second half of the year, and for several weeks it was necessary to keep both stations connected with their mains whilst the reliability of the new plant was being proved, and as could be understood that added to the costs. As soon as the new plant at the new station was in efficient working order, the transfer of the plant from the old to the new station was taken in hand, and its installation had now been practically completed. During the year several small extensions to the mains were carried out in the populous portions of the city within the old town of Bombay. In consequence of the conservative habits of the bulk of the people, it had taken some time for them to arrive at an appreciation of the advantages of electric supply, and for some years their development in this direction moved but slowly, and their field of exploitation was mainly restricted to the more European centres of business and the residential districts. It was satisfactory to be able to say that now there was a decided change in this respect, and inquiries and applications for supplies were increasing rapidly from traders and others in the heart of the town. Several further extensions of their mains had been undertaken in response to this demand and the increasing revenue from these would, he was confident, make itself felt in the returns they would submit next year. Side by side with this development of supply, he was glad to inform them that the working of their new power house had effected a considerable reduction in their generating costs. In the first two months of the current year the cost per unit delivered showed a reduction of 22 per cent. on the costs of the same two months last year, and as their load increased the fixed costs of generation would of course show a progressive decline. In the year under review they secured 597 new consumers, representing an increase of 40 per cent. on the previous year, and taking a supply equivalent to 41,733 lamps of 8-C.P., being an increase of 20 per cent. Contracts had recently been entered into with the Bombay, Baroda and Central India Railway Co. and with the Findley Mills Co. for a supply of power. During the year the capital expenditure amounted to £86,698. Of this, £81,389 represented expenditure in the electricity supply branch, chiefly in connection with the construction and equipment of their new power station. The amount of £4,122 was expended in connection with the tramways, mainly for new rolling stock. The investments were taken in the balance-sheet at their cost price, viz., £42,480, and the average yield obtained exceeded 4½ per cent. He wished to testify to the services rendered by the staff, especially during the anxious period of the Royal visit, when much arduous work devolved upon them, both in connection with the illuminations and the heavy tramway traffic. A telegram had just reached him from Bombay, showing that in the first five months of the present year the gross earnings showed an increase of 13·12 per cent., as against an increase of 8·7 per cent. in the first five months of last year over the corresponding period of the preceding year.

MR. E. GARCKE seconded the motion, and the report was adopted without discussion.

Direct United States Cable Co., Ltd.

THE meeting of this company, held on Tuesday last week at Winchester House, E.C., was presided over by MR. E. M. UNDERDOWN, K.C., who, after remarking that the dividend proposed had already been paid in order to meet the wishes of the Western Union Co., said that they now had no direct concern in the working of the cable—their duty was simply to maintain and repair it. The traffic was dealt with by the Western Union Co., who collected all the revenue and discharged the expenses. They received the rental set out in the lease, and that for the nine months to March 31st amounted to £45,426. Adding to this, the interest and dividends on the reserve fund investments, the total revenue amounted to £62,436. Out of that they had to pay the cost of repairs to the cables, income-tax, and consulting electrician's fee, amounting together to £12,160, leaving a balance available for dividend of £50,276. The dividend and bonus at the rate of 5 per cent. per annum for the nine months, which was the highest that under the lease they were permitted to pay without the assent of the Western Union Co., absorbed £42,876, and the balance of £7,399 had been transferred to the reserve account. After charging all the expenses in connection with the negotiations resulting in the lease, which were necessarily somewhat high, and reserving the sum of £10,803, which they had to pay the Western Union Co., on the determination of the lease, the balance of the reserve fund was well in excess of half-a-million, the exact figure being £509,128. Last December the main cable was interrupted in the mid-Atlantic, and its repair would naturally involve considerable expense. It was impossible to undertake the repair in the winter, but at the latter end of last month the cable ship *Faraday* sailed for the position for the purpose of effecting the repair. They had had news that she was on the position, and there was sufficient equipment of cable on board to enable her to do all that was necessary in the way of repairs. He might say that the Western Union Co. had given very considerable evidence of their desire to carry out the terms of the lease in the most liberal manner. He learned that the traffic receipts had been well maintained, and they knew that the Western Union Co. were quite satisfied; in fact, he saw the chairman recently, and he expressed himself as very much pleased with the relations that existed between them, and acknowledged that they had only done what they ought to in protecting the interests of their shareholders. They were quite satisfied with the arrangements that had been come to with them and the Anglo-American Co., and they, on their part, were perfectly satisfied, too.

The HON. T. H. A. E. COCHRANE seconded the motion, and the report was adopted.

Electro-Metallurgy in Switzerland.—The report of the Société Electrométallurgique Paul Girod, of Neuchatel, records net profits of £15,000 in 1911, as against £2,000 in the previous year. After placing £4,000 to depreciation the balance has been carried forward. The report states that the increase in the net profits was partly due to the setting in operation of the St. Gervais works. Various technical advances were made in important branches of manufacture, and an understanding was proceeding in regard to securing stability in the sale prices for alloys. The effect of the syndicate for ferro-silicon was only slightly noticeable during the year, although the company has assured its position in the syndicate, and has utilised a large amount of power for the production of ferro-silicon. During the year the company made 7,000 tons of alloys, as compared with 5,000 tons in 1910. At the recent meeting reference was made to the proposed reorganisation of the undertaking, the rapid development of which has rendered it necessary for considerable banking credit to be obtained. Owing to the decline in the prices of alloys during the past two years, and the difficulties encountered in starting the steel works, the idea of raising additional capital by the issue of new shares and bonds has had to be abandoned. A Franco-Swiss financial group now proposes to form a new company with an ordinary share capital of £480,000 to take over the Neuchatel company, and also to issue bonds of £320,000. The organisation of the new company is to be arranged so as to permit also of the absorption of the Compagnie des Forges et Aciéries Electriques Paul Girod, in which the Swiss company is largely interested. The holders of ordinary shares in the Société Electro-métallurgique will only receive £10 shares in the new company for their present £20 share.

STOCKS AND SHARES.

Tuesday Evening.

IN spite of the fact of its being July, some of the markets concerned with Electrical stocks and shares are still active enough, more particularly those connected with what we call, for want of a better name, the Latin-Canadian group. Here there is still very considerable activity—a little patchy, perhaps, but, on the whole, a good deal more than might be expected from the season of the year and the apathy of the investor so far as other markets are concerned.

Home Railways, after being flat, have experienced a mild recovery. It would almost seem that there is some mysterious character taking the heart out of holders, for it is difficult to lay the whole blame of the selling to the door of the labour troubles that still bother the body industrial. Indeed, the stocks of the great trade lines of the country are amongst those which hold their prices with a fair amount of tenacity, the depression being most noticeable amongst speculative issues, such as Brighton Deferred and some of the Underground stocks. District have gone back 2¾, Metropolitans 3½. Central London Deferred shed 3, but rallied 5, and the Preferred stock has gone back a point. The Ordinary is 2 higher. City and South London slumped to 35, but recovered more than its loss, being ½ up on the week. Great Northern and City Preferred are unchanged, notwithstanding the advertisement which the Company received the other day when traffic was practically suspended for a couple of hours owing to a slight accident.

Underground Electric issues have hardened, and the income bonds rose a point after their fall. Much discussion continues to rage around the position of the various securities connected in one way or another with the London General Omnibus Co., and speculation goes on merrily enough in the Underground Electric 1s. shares, which have been fluctuating between 13s. 9d. and 15s. 9d., being now, this Tuesday evening, about midway between these two figures. British Electric Traction 7 per cent. Preference has given way, and London United Preference at 5⅞ are ⅛ lower, the Debenture stock at 75½ being *ex* 2 per cent. dividend. A large number of other stocks are also quoted *ex* dividend in our lists this week.

The Electric Supply market is very firm, without fresh business developing to any material extent. Charing Cross came into some demand at 4¼. Bournemouth and Poole Ordinary are only buyers, and on the basis of 10½. In connection with this, attention may again be drawn to the misleading character sometimes assumed by Stock Exchange quotations in the Official List. It is a thousand pities that the Committee do not see their way to fix some sign by which it would be seen at once from a price that there were only

buyers or only sellers in the market for the time being. It is a reform that could be easily carried out, and one which would prove of great value, both to brokers and to their clients. City Lights have not recovered from their recent dulness, the Ordinary being quoted at 18 middle and the Preference at 16. Hove shares are 10s. up at 7½.

In the Latin-Canadian group, as already mentioned, business is animated enough. Speculation centres principally around Mexico Trams, Rio Trams, Mexican Light and Power and one or two others; but in all the issues there is a steady volume of trade going on. Rio Trams touched 160, dropped to 151, and then rallied to 156 after the announcement of the proposed amalgamation between this undertaking, the Sao Paulo Tramways, and Sao Paulo Electric Company. A new holding concern, called the Brazilian Traction, Light and Power Company, Ltd., has been incorporated to do the deal, and at first the Stock Exchange was inclined to regard the transaction as distinctly favourable. Then people began to ask what the Sao Paulo Electric Company was, and inquired about the market in its shares. When it became evident that little information was available, and that there was no market whatever, the sceptical began to ask whether the proposed amalgamation was a quiet way for marketing the shares of the Sao Paulo Electric Company; and on the consideration that, after all, the Rio Tramways might not benefit greatly by the deal, the price dropped, to go ahead later. Sao Paulo shares from 252½ have fallen back to 240½. Mexico Trams are 2 points lower on the week, the shares being affected by the movements of the Tramway group; but Mexican Light and Power, after sprinting to 102, eased off to 97½, still showing a rise of a point. The Preference, on the other hand, from 112½ have gone back to 110½. Montereys are steady, without change. Montreals have risen 6 points, and Shawinigan Water remains at 144. Lively dealings in Mexican Northern Power bonds put up the price to 77 at one time, and at the moment it is 74, *ex* the dividend of 2½ per cent. deducted last Monday, while the shares have reacted to 29.

Kalgoorlie Electric Trams "A" Debenture is down 3, and the 6 per cent. "B" Debenture 8½ on the report. The directors state that owing to a decline in the company's earnings, they have no option but to pay interest on the "B" Debenture stock at the rate of 3 per cent. only, instead of the full 6 per cent.

The feature in the Telegraph market has been a big rise in National Telephone Deferred stock, the price at one time jumping 10 points to 153, and reacting but slightly from this. The Third Preference have also come into prominence again, and smaller speculators are buying these, because it is argued in some quarters that holders of the Third Preference will do better, at the present price, out of the result of the arbitration than proprietors of the Deferred stock. What there has been up to the present in the arbitration proceedings to cause the prices to fluctuate so substantially, it is a little difficult to see; but a small clique of speculators is at work, and one of their aims apparently is to make the market look as volatile as possible.

Marconis, after being comparatively steady during the last week or two, have braced up again, and show advances. The old shares hardened to 6¼, while Americans rose to 1⅛, Canadians to 25s. 6d., with Spanish rather a dull market at 25s. The American and Eastern groups are firm, without showing any particular characteristics. A good many issues are *ex* dividend, the deductions in several cases being already partially recovered.

The mention of *ex*-dividend markings serves as a reminder of the remarkably high yields obtainable from certain stocks and shares in the list of electric manufacturing companies. Reference to the price-lists overleaf shows that Aron Ordinary are paying at the rate of 8 per cent. on the money, while on Brush Second Debenture 11¼ per cent. can be obtained, on Crompton Debenture 7½ per cent., and so on. It is a truism, of course, that the higher the yield, the greater the risk. General Electric Preference have again risen 10s. on the top of their 17s. 6d. advance of last week, the price having hardened to nearly 11. The Rubber market, after being upset last week by the advent of the Synthetic Products Co., Ltd., took a sharp turn for the better when the actual prospectus was out. It does not require a very careful examination of this document to see that, commercially speaking, the latest synthetic production is not in the least likely to compete with the raw material, for at all events, several years to come.

Chili Telephone Co., Ltd.—The directors' report to March 31st, 1912, states that the aggregate number of subscribers at all centres at the end of the year was 11,647, a gain of 1,728 for the year. The gross revenue in Chile from all sources in 1911-12 was $2,307,818, an increase of $266,620. The expenditure in Chile was $1,136,970, an increase of $160,400. The net income in Chile from all sources was $1,170,847, an increase of $106,220. The average rate of exchange for the year was 10·49d., as compared with 10·90d. in the previous year, giving a decrease for the year of 0·41d. Converted into sterling at these rates, the income figures just given are £51,210, showing an increase of £2,853. The liquid assets and liabilities in Chile on March 31st, 1912, were valued at 10½d., the current rate of exchange on that day, the same rate at which they were valued on the corresponding date of the previous year. The balance to the credit of the revenue account, including £3,225 brought from the previous year, is £52,185, of which £23,942 has been carried to reserve. An interim dividend of 3s. per share, less income-tax, was paid on January 16th last, and the directors now recommend a final dividend of 5s. per share, less income-tax, leaving a balance of £3,382 to be carried forward.

MARKET QUOTATIONS.

It should be remembered, in making use of the figures appearing in the following list, that in some cases the prices are only general, and may vary according to quantities and other circumstances.

Wednesday, July 3rd.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec.
a Acid, Hydrochloric	per cwt.	5/-	..
a „ Nitric	„	22/-	..
a „ Oxalic	per lb.	2¾d.	..
a „ Sulphuric	per cwt.	5/6	..
a Ammoniac Sal	„	42/-	..
a Ammonia, Muriate (large crystal)	per ton	£29 10	..
a Bleaching powder	„	£5 10	..
a Bisulphide of Carbon	„	£18	..
a Borax	„	£16 10	..
a Copper Sulphate	„	£24 15	..
a Lead, Nitrate	„	£26 10	..
a „ White Sugar	„	£25 10	..
a „ Peroxide	„	£32	..
c Methylated Spirit	per gal.	2/6	..
a Potassium, Bichromate, in casks	per lb.	3½d.	..
a Potash, Caustic (88/90 %)	per ton	£22 10	..
a „ Chlorate	per lb.	3½d.	..
a „ Perchlorate	„	4½d.	..
a Potassium, Cyanide (98/100 %) (for mining purposes only)	„	7½d.	..
a Shellac	per cwt.	70/-	5/- dec.
a Sulphate of Magnesia	per ton	£4 10	..
a Sulphur, Sublimed Flowers	„	£6 10	..
a „ Recovered	„	£5 10	..
a „ Lump	„	£5 5	..
a Soda, Caustic (white 70/72 %)	„	£10 5	..
a „ Chlorate	per lb.	3½d.	..
a „ Crystals	per ton	£3 5	..
a Sodium Bichromate, casks	per lb	8d.	..
METALS, &c.			
b Aluminium Ingots, in ton lots	per ton	£75	£5 inc.
b „ Wire, in ton lots	„	£102	..
b „ Sheet, in ton lots	„	£120	..
p Babbitt's metal ingots	„	£38 to £145	..
c Brass (rolled metal 2" to 12" basis)	per lb.	9½d.	1d. inc.
c „ Tube (brazed)	„	11⅛d.	⅛d. inc.
c „ „ (solid drawn)	„	10d.	⅛d. inc.
c „ Wire, basis	„	9½d.	..
c Copper Tubes (brazed)	„	1/0⅝d.	⅛d. inc.
c „ „ (solid drawn)	„	1s.	⅛d. inc.
g „ Bars (best selected)	per ton	£94	£2 dec.
g „ Sheet	„	£94	£2 dec.
g „ Rod	„	£94	£2 dec.
d „ (Electrolytic) Bars	„	£81 10s.	10s. inc.
d „ „ Sheets	„	£99 10	..
d „ „ Rods	„	£88	10s. inc.
d „ „ H.C. Wire	per lb.	10½d.	..
f Ebonite Rod	„	5/3	..
f „ Sheet	„	4/9	..
n German Silver Wire	„	1/7	..
h Gutta-percha, fine	„	..	..
h India-rubber, Para fine	„	4/9	1½d. inc.
i Iron Pig (Cleveland warrants)	per ton	54/1	..
l „ Wire, galv. No. 8, P.O. qual.	„	£14	..
g Lead, English Pig	„	£18 15s. to £19	5s. inc.
m Manganin Wire No. 28	per lb.	6/6	..
g Mercury	per bot.	£8	5/- dec.
c Mica (in original cases) small	per lb.	6d. to 3s.	..
c „ „ „ medium	„	3/6 to 6/-	..
c „ „ „ large	„	7/6 to 11/-	..
p Phosphor Bronze, plain castings	„	11d.	..
p „ „ rolled bars & rods	„	1/0½	..
p „ „ rolled strip & sheet	„	1/1	..
o Platinum	per oz.	185/-	..
d Silicium Bronze Wire	per lb.	11d.	⅛d. inc.
r Steel Magnet, in bars	per ton	£55	..
g Tin, Block (English)	„	£208 to £209	..
n „ Wire, Nos. 1 to 16	per lb.	2/5	..
p White Anti-friction Metals	per ton	£45 to £150	..
k Zinc, Sh's (Vieille Montagne bnd.)	„	£29 15	..

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakspeare.
h Edward Till & Co.
i Bolling & Lowe.
k Morris Ashby, Ltd.
l Richard Johnson & Nephew, Ltd.
m W. T. Glover & Co., Ltd.
n P. Ormiston & Sons
o Johnson, Matthey & Co., Ltd.
p
r W. F. Dennis & Co.

Monterey Railway, Light and Power Co.—The annual report of this company for the year ended December 31st, 1911, states that the effect of the disturbances in Mexico during the year 1911 has not been so great in Monterey and its immediate neighbourhood as it has been in other parts. On the other hand, the general situation in the Republic has tended to restrict business development and travel in Monterey and in the State of Nuevo Leon, as well as in the other States of Mexico. Notwithstanding this (says the *Times* abstract of the report) the total net earnings have increased, although the earnings from the railway service have shown a slight decrease over the corresponding earnings of the previous year. The gross income was $506,984, less debenture interest, $289,997; dividend on preference stock, $25,000; surplus, $191,987. The profit and loss account shows a total surplus of $573,162 gold. The directors have considered it advisable to begin the creation of a reserve fund, and have, therefore, passed to the credit of reserve from the surplus the sum of $150,000.

SHARE LIST OF ELECTRICAL COMPANIES.

ENGLISH ELECTRICITY SUPPLY AND POWER COMPANIES.

NAME.	Stock or Share.	Dividends for 1910.	Dividends for 1911.	Closing Quotations July 2nd.	Rise + or Fall —	Present Yield p.c. £ s. d.
Bournemouth & Poole, Ord. ..	10	5½	6½	9⅜ — 10⅜	..	5 2 4
Do. 4½ % Pref.	10	4½	4½	9 — 10	..	4 10 0
Do. Second 6 % Pref. ..	10	6	6	10¾ — 11	..	5 9 1
Do. 4½ % Deb. Stock	Stock	4½	4½	98 —100 xd	..	4 10 0
Brompton & Kensington, Ord...	5	10	10†	8¼ — 8⅝	..	5 14 3
Do. 7 % Cum. Pref.	5	7	7	7⅝ — 8⅛	..	4 6 2
Central Electric Supply, 4 % Guar. Deb.	100	4	4	97 —100	..	4 0 0
Charing Cross, West End & City	5	5	5	4¼ — 5	..	5 0 0
Do. 4½ % Cum. Pref.	5	4½	4½	4¼ — 4⅝	..	4 17 4
Do. "City Undertaking" 4½ % Cum. Pref.	5	4½	4½	8⅜ — 4¾ xd	..	5 6 0
Do. Do. 4 % Deb...	100	4	4	94 — 96	..	4 3 4
Chelsea, Ord.	5	5	5	4⅜ — 4½	..	5 2 7
Do. 4½ % Deb.	Stock	4½	4½	97 —100 xd	..	4 10 0
City of London, Ord.	10	7	8	17 — 19	..	4 4 3
Do. 6 % Cum. Pref.	10	6	6	15 — 17	..	3 10 7
Do. 5 % Deb.	Stock	5	5	117 —121 xd	..	4 2 8
Do. 4½ % Second Deb. ..	100	4½	4½	99 —102 xd	..	4 8 3
County of London, Ord... ..	10	5	6	10⅜ — 1⅛	..	5 5 6
Do. 6 % Pref.	10	6	6	11½ — 12	..	5 0 0
Do. 4½ % Deb.	Stock	4½	4½	106 —108 xd	..	4 3 4
Do. 4½ % Second Deb. ..	Stock	4½	4½	100 —103	..	4 8 3
Edmundson's, Ord.	5	Nil	Nil	7/16 — 1/4	..	Nil
Do. 6 % Cum. Pref.	5	Nil	Nil	3— 3½	..	Nil
Do. 4½ % First Mort. Deb. ..	100	4½	4½	86 — 89	..	5 1 2
Folkestone	5	6	6	4⅜ — 5¼	..	5 14 3
Do. 5 % Cum. Pref.	5	5	5	4¼ — 5¼	..	4 15 3
Do. 4½ % First Deb.	100	4½	4½	94 — 97	..	4 12 9
Hove	5	9	9	7¼ — 7½	+ ½	5 16 2
Kensington & Knightsbridge, Ord	5	9	9	7⅛ — 7⅜	..	5 16 2
Do. 4 % Deb.	Stock	4	4	92 — 95	..	4 4 3
Kent Elec. Power, 4½ % Deb. ..	Stock	4½	4½	80 — 84	..	5 7 2
London Electric, Ord.	8	2	2½	1⅛ — 1⅜	..	4 5 6
Do. 6 % Pref.	5	6	6	4⅜ — 5¼	..	5 14 3
Do. 4 % First Mort. Deb. ..	Stock	4	4	90 — 93	..	4 6 0
Metropolitan	5	5	4	3½ — 4	..	6 1 3
Do. 4½ % Cum. Pref... ..	5	4½	4½	4¼ — 4⅝ xd	..	4 17 4
Do. 4½ % First Mort. Deb..	Stock	4½	4½	99 —102 xd	..	4 8 3
Do. 3½ % Mort. Deb... ..	Stock	3½	3½	85 — 87	+1½	4 0 6
Midland Electric Corporation 4½ % First Mort. Deb.	100	4½	4½	94 — 96 xd	..	4 13 9
Newcastle-on-Tyne 5 % Pref., Non-Cum.	5	5	5	4½ — 5	..	5 0 0
North Metropolitan Power Supply, 5 % Mortgages (Red.)	100	5	5	100 —103	..	4 17 1
Notting Hill, 6 % Non-Cum. Pref.	10	..	6	10 — 11 xd	..	5 9 1
Oxford	5	7½	7½	5⅞ — 6⅜	..	5 13 9
St. James' and Pall Mall, Ord.	5	10	10	8 — 8⅜	..	5 14 3
Do. 7 % Pref.	5	7	7	6⅞ — 7⅜	..	4 15 0
Do. 3½ % Deb.	100	3½	3½	82 — 85 xd	..	4 2 4
Smithfield Markets, Ord. ..	5	Nil	2	1⅜ — 1½	..	..
South London, Ord.	4	5	5	2⅞ — 3⅜	+ ¼	5 18 4
Do. 5 % First Mort. Deb. ..	100	5	5	98 —101 xd	..	4 19 0
South Metropolitan, 7 % Pref...	1	7	7	1⅞ — 1⅞	..	6 1 0
Do. 4½ % First Deb. Stock ..	100	4½	4½	97 — 100	+1	4 10 0
Urban, Ord...	£3	5	..	1/16 — 3/16	..	..
Do. 5 % Cum. Pref.	5	5	2	2½ — 3	..	3 6 8
Do. 4½ % First Mort. Deb. ..	100	4½	4½	86½ — 88½	+ ½	5 1 8
Westminster, Ord, ...	5	10	10	8½ — 8¾	..	5 14 3
Do. 4½ % Cum. Pref... ..	5	4½	4½	5 — 5⅛ xd	..	4 5 9

COLONIAL AND FOREIGN ELECTRICITY SUPPLY AND POWER.

Adelaide, 6 % Pref.	5	6	6	5⅜ — 5⅞	..	5 2 2
Calcutta, Ord.	5	8½	8½	7⅛ — 7⅜	..	5 11 6
Do. 5 % Pref.	5	5	5	5 — 5¼	..	4 15 3
Calgary Power, 1st Mort. Bds.	100	5	5	95 — 97 xd	..	5 3 1
Canadian Gen. El. Com. ..	$100	7	7†	112 —116 xd	..	6 0 8
Do. 7 % Pref.	$100	7	7	120 —124	..	5 13 0
Cordoba Lt., Power and T., Ord.	1	8	8†	1⅛ — 1/16	..	3 4 0
Do. 5 % Deb.	100	5	..	94 — 97	..	5 3 1
Elec. Lt. and P. of Cochabamba, 6 % Bonds	100	6	6	91½ — 93½	..	6 8 4
Elec. Supply Victoria, 5 % 1st Mort. Deb.	100	5	5	81 — 84 xd	..	5 19 1
Elec. Dev. Ontario, 5 % 1st Mort. Bonds	$500	5	5	94½ — 96½	..	5 3 8
Kalgoorlie Elec. P. and L., Ord.	10/-	Nil	..	¼ — ⅜	..	Nil
Do. 6 % Pref.	1	6	6	3/16 — 3/8	..	8 6 0
Kaministiquia Power, 5 % G. Bs.	$500	5	5	104 —106 xd	..	4 14 4
Madras, Ord.	5	..	..	2 — 2½	— ⅛	..
Melbourne, 5 % 1st Mort. Deb.	100	5	5	102 —105 xd	..	4 15 3
Mexican El. Lt., 5 % 1st M. Bds.	..	5	5	89 — 91 xd	..	5 10 0
Mexican Lt. & Power, Common	$100	4	4	96 — 99	+1	4 0 10
Do. 7 % Cum. Pref.	$100	7	7	109 —112	—2	6 5 0
Do. 5 % 1st Mort. Gold Bds.	..	5	5	98½ — 100½	..	4 19 6
Monterey Rly. Light & Power, 5 % 1st Mort. Deb.	100	5	5	89½ — 91½	..	5 9 3
Montreal, Lt., H. and Power ..	$100	7	8	217 —222	+ 6	3 12 1
Northern, Lt., Power and Coal, 5 % 1st Mort. Bonds	$500	5	5	39 — 42	..	11 18 2
River Plate, Ord.	Stock	10	10	240 —250	..	4 0 0
Do. 6 % Non-Cum. Pref. ..	Do.	6	6	109 —114	..	5 5 8
Do. 5 % Deb. Stock	Do.	5	5	101 —103 xd	..	4 17 1
Roy. Elec. Co., Montreal, 4½ % 1st Mort. Deb.	100	4½	4½	99 —101	..	4 9 1
Shawinigan Water, Capital ..	$100	4	5†	142 —146	..	3 8 6
Do. 5 % Con. 1st Mort. Bonds	$500	5	5	109 —111 xd	..	4 10 1
Do. 4½ % Per. Deb.	Stock	4½	4½	104 —106	..	4 5 0
Toronto Power, 4½ % Deb. ..	Do.	4½	4½	98½ — 100½	..	4 9 7
Vera Cruz Lt., P. and T., 5 % 1st Mort. Deb.	100	5	5	90 — 92 xd	..	5 8
Victoria Falls Power, Pref. ..	1	Nil	11¾d.	7/16 — 15/16 xd	..	..
West Kootenay Power and Lt., 1st Mort. 6 % Gold	100	6	6	105½ — 107½	..	5 11 7

TELEGRAPH AND TELEPHONE COMPANIES.

Amazon Telegraph	10	Nil	4†	7⅛ — 7⅜	..	5 3 3
Do. 5 % Deb. Red.	Stock	5	5	96 — 98 x	+1	5 2 0
American Telep. & Teleg., Cap.	$100	8	8†	147½ — 149½ x	+1	5 7 0
Do. Collat. Trust	$1000	4	4	94 — 96 x	+ ½	4 3 4
Anglo-American Telegraph ..	Stock	3½	3	65 — 67	..	4 9 7
Do. 6 % Pref.	Do.	6	6	110 —111	+ ¾	5 8 1
Do. Def.	Do.	30/-	30/-	25¼ — 25¾	..	5 16 6
Anglo-Portuguese Tel., 5 % Mort. Deb.	100	5	5	102½ — 104½	..	4 16 2
Chili Telephone	5	7	..	7⅜ — 8	..	4 10 4
Commercial Cable, Stlg. 4 % Deb.	Stock	4	4	82 — 84 xd	+1½	4 15 3
Cuba Telegraph	10	6	6†	9½ — 10½	..	5 14 3
Do. 10 % Pref.	10	10	10	16½ — 17½	..	5 14 3
Direct Spanish Telegraph, Ord.	5	4	4†	8¼ — 8½	..	5 6 8
Do. 10 % Cum. Pref.	5	10	10	7 — 7⅜	..	6 9 0
Direct United States Cable ..	10	4½	5	7⅜ — 7⅝	..	6 7 0
Direct W. India Cable, 4½ % Reg. Deb.	100	4½	4½	98 —100 xd	..	4 10 0
Eastern Telegraph, Ord. Stock	Stock	7	5†	130 —133	..	5 5 3
Do. 3½ % Pref. Stock.. ..	Do.	3½	3½	76½ — 78½	—1	4 9 2
Do. 4 % Mort. Deb.	Do.	4	4	99 —101	..	3 19 3
Eastern Extension	10	7	5†	12⅝ — 13¼	..	5 5 8
Do. 4 % Deb.	Stock	4	4	99 —101	..	3 19 3
East and S. Africa Tel. 4 % Mt. Db. Mauritius Sub.	25	4	4	97 —100	..	4 0 0
Globe Telegraph and Trust ..	10	5⅞	6†	10⅜ — 11⅛ xd	..	5 6 8
Do. 6 % Pref.	10	6	6	12⅜ — 13⅛ xd	..	4 10 7
Great Northern Telegraph ..	10	18	18	27½ — 28½	..	6 6 4
Indo-European Telegraph ..	25	13	5†	56 — 58	..	5 3 5
Mackay Companies Common ..	$100	5	5	88 — 91	..	5 10 0
Do. 4 % Cum. Pref.	$100	4	4	70 — 73	..	5 9 7
Marconi's Wireless Telegraph	1	5	20	6 3/16 — 6 5/16	+ 1/16	3 3 3
Do. 7 % Cum. Partic. Pref.	1	16	17	5⅜ — 5⅝	+ ⅛	3 0 4
Monte Video Telephone, Ord...	1	6	6	1 — 1⅛	..	5 6 3
Do. 5 % Pref.	1	5	5	⅜ — ⅞	..	5 14 3
National Telephone, Pref. ..	Stock	6	6	101 —104	+1	..
Do. Def.	Do.	6	6	151 —153	+9	..
Do. 5 % Non-cum. 3rd Pref.	5	5	5	6 3/16 — 6 7/16	+ 1/16	..
New York Telep., 4½ % Gen. Bnds.	100	4½	4½	99½ — 100½	+ ¼	4 9 9
Oriental Telep. and Elec. ..	1	8	8	1½ — 1⅝	..	4 13 0
Do. 6 % Cum. Pref.	1	6	6	1/16 — 1/8	..	4 16 0
Do. 4 % Red. Deb.	Stock	4	4	88 — 90 xd	+1	4 9 0
Pacific and European Tel., 4 % Guar. Debs.	Do.	4	4	98 —100 xd	..	3 18 5
Reuter's	8	5	5†	11¼ — 11¾	..	3 8 0
Submarine Cables Trust ..	Cert.	6	6	127 —130	..	4 12 4
Telephone Co. of Egypt, 4½ % Deb. Red.	Stock	4½	4½	99 —101 xd	+1/2	4 9 1
United River Plate Telephone Do. 5 % Cum. Pref.	8	8	8	7⅝ — 7⅞	..	5 1 7
West Coast of America	5	5	5	5¼ — 5⅜ xd	..	4 11 0
Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	2½	2½	2½	1 1/16 — 1 3/16	..	4 0 0
West India and Panama Teleg.	100	4	4	96 — 99 xd	+2	4 0 10
Do. 6 % Cum. 1st Pref. ..	10	1½	½	25/8 — 27/8	..	1 14 9
Do. 6 % Cum. 2nd Pref. ..	10	6	6	10¼ — 10⅝	..	5 11 7
Do. 5 % Debs.	100	6	6	9⅞ — 10¼	..	5 17 1
Western Telegraph, Ltd. ..	10	5	5	100⅜ — 102⅜ xd	..	4 17 7
Do. 4 % Deb.	Stock	7	6†	13 — 13⅜ xd	..	5 3 8
Western Union 4½ % Fdg. Bonds	$1000	4½	4½	96 — 98 xd	..	4 1 8
				100 —103	..	4 7 5

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Continued on next page

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRIC RAILWAYS AND TRAMWAYS.—HOME.

NAME.	Stock or Share.	Dividends for		Closing Quotations July 2nd.	Rise + or Fall —	Present Yield p.c.
	*	1910.	1911.			£ s. d.
Bath Trams, Pref. Ord.	1	Nil	Nil	7/8 — 1 1/16	..	Nil
Do. 5 % Pref.	1	5	5	33/64 — 33/64 xd	..	6 8 1
Do. 4½ % Deb.	100	4½	4½	78 — 83	..	5 8 5
Brit. Elec. Trac., 6 % Pref.	100	..	..	11 — 13	..	..
Do. Do. Deferred	100	..	..	6 — 8	..	..
Do. Do. 6 % Cum. Pr'f.	100	..	6	90 — 92 xd	..	6 10 5
Do. 7 % Non-Cum. Pr'f.	100	..	..	40 — 44	—1	..
Do. 5 % Perp. Deb.	100	5	5	93 — 97	..	5 3 1
Do. 4½ % 2nd Deb.	100	4½	4½	80 — 84	..	5 7 2
Central London Railway, Ord.	100	3	3	77 — 79	+2	3 16 0
Do. Pref.	100	4	4	83 — 85	—1	4 14 3
Do. Def.	100	2	2	76 — 78	+2	2 11 3
Do. 4 % Deb.	100	4	4	100 —102 xd	..	3 18 5
City & South London, Ord.	100	1½	1⅝	37 — 38	+ ½	4 5 6
Do. 5 % Pref., 1891	100	5	5	108 —110	..	4 11 0
Do. Do. 1896	100	5	5	104 —106	..	4 15 3
Do. Do. 1901	100	5	5	104 —106	..	4 14 4
Do. Do. 1908	100	5	5	103 —105	..	4 15 3
Do. 4 % Deb.	100	4	4	99 —101	..	3 19 3
Dublin United Trams, 6 % Pref.	10	6	6	10⅜ — 11⅛	..	5 2 2
Great Northern & City, Pr'f. Ord	10	Nil	..	1⅜ — 1⅝	..	Nil
Hastings Trams, 6 % Pref.	5	Nil	6	3/16 — 5/16	..	8 0 0
Do. 4½ % Deb.	100	4½	4½	71 — 76	..	5 18 5
Isle of Thanet Trams, 5 % Pref.	5	2½	2½	2¼ — 2⅜	..	4 11 0
Do. 4 % Deb.	100	4	4	73 — 78 xd	..	5 2 7
Lancashire United, 5 % Deb.	100	5	5	81 — 83 xd	..	6 0 6
London Elec. Railw'ys, 4 % Deb.	100	4	4	95 — 97 xd	..	4 2 6
London United Trams, 5 % Pref.	10	Nil	..	5⅛ — 5⅜	— 1/16	..
Do. 4 % Deb.	100	4	4	74 — 77 xd	..	5 4 0

NAME.	Stock or Share.	Dividend for		Closing Quotations July 2nd.	Rise + or Fall —	Present Yield p.c.
	*	1910.	1911.			£ s. d.
Metropolitan Railway Consol.	100	1⅜	1⅞	60 — 60½	—3/4	3 2 0
Do. Surplus Lands	100	2⅜	2⅝	67 — 69	..	4 3 4
Do. 3½ % Deb.	100	3½	3½	89 — 91	..	3 16 11
Do. 3½ % Pref.	100	3½	3½	86 — 88	..	3 19 7
Do. 3½ % Con. Pref.	100	3½	3½	87 — 89	..	3 18 8
Metropolitan District Ord.	100	Nil	..	39 — 39½	—2 3/4	Nil
Do. 6 % Deb.	100	6	6	142 —144 xd	+1	4 3 4
Do. 4 % Deb.	100	4	4	94 — 96 xd	..	4 3 4
Do. 4 % Prior Lien	100	4	4	99 —101	..	3 19 8
Do. 4½ % First Pref.	100	4½	4½	90 — 92	..	4 17 10
Do. 3½ % Gtd.	100	3½	3½	76 — 78	..	4 9 9
Metropolitan Elec. Trams, Ord.	1	5½	6	1/16 — 1	..	6 0 0
Do. Def.	1	Nil	..	1/16 — 1/16	..	Nil
Do. 5 % Pref.	1	5	5	29/32 — 31/32	..	5 10 6
Do. 4½ % Deb.	100	4½	4½	96 — 98 xd	..	4 11 10
Do. 5 % Deb.	100	5	5	98 —100	..	5 0 0
Potteries, Ord.	1	2	..	5/16 — 7/16	..	..
Do. 5 % Pref.	1	5	5	7/16 — 1/2	..	6 13 4
Do. 4½ % Deb.	100	4½	4½	87 — 90	..	5 0 0
South Metro. Trams, 6 % Pref.	1	6	..	1 1/16 — 1 3/16	..	7 7 8
Do. 4 % Deb.	100	4	4	70 — 75 xd	..	5 6 8
Underground Elec. Railways	10	..	..	4 1/16 — 4 3/16	+ 1/8	Nil
Do. 4½ % Deb.	100	4½	4½	98 —100 xd	..	4 10 0
Do. 6 % Income	100	1	1½†	88 — 90	+1	..
Yorkshire (West Riding), Ord.	5	Nil	..	1/4 — 3/8	..	Nil
Do. 6 % Pref.	5	Nil	3	2 7/16 — 3 3/16 xd	..	4 9 0
Do. 4½ % Deb.	100	4½	4½	78 — 82 xd	..	5 9 9

ELECTRICAL RAILWAYS AND TRAMWAYS.—COLONIAL AND FOREIGN.

Anglo-Arg. Trams, 1st Pref.	5	5	5½	5 3/8 — 5 7/16	..	5 1 2
Do. 2nd Pref.	5	5	5⅝	4 13/16 — 5 3/16	..	5 6 0
Do. 4 % Deb.	100	4	4	94½ — 96	..	4 3 4
Do. 4½ % Deb.	100	4½	4½	99½ —101½	..	4 8 8
Do. 5 % Deb.	100	5	5	101 —103	..	4 16 2
Auckland Trams, 5 % Deb.	100	5	5	102 —104 xd	..	4 14 4
Bombay Elec. S. & Trams, Pref.	10	6	6	11 1/8 — 11 5/8	..	5 3 3
Do. 4½ % Deb.	100	4½	4½	96 — 98 xd	..	4 11 10
Do. 5 % 2nd Deb.	100	5	5	96⅞ — 98½ xd	..	5 1 6
Brisbane Trams Invt., Ord.	8	8	8	7 — 7⅛	..	5 6 8
Do. 5 % Pref.	5	5	5	4 7/16 — 5 1/16	..	4 15 3
Do. 4½ % Deb.	100	4½	4½	99 —102 xd	..	4 8 3
B. Columbia Elec. Rly., Def.	100	8	8†	135 —140	..	5 14 4
Do. Pref. Ord.	100	6	6	118 —123	..	4 17 7
Do. 5 % Pref.	100	5	5	107 —110	..	4 11 0
Do. 4½ % 1st Mort. Deb.	40	4½	4½	99½ —102½	..	4 7 10
Do. 4½ % Vancouver Deb.	100	4½	4½	103 —105	..	4 5 9
Do. 4½ % Con. Deb.	100	4½	4½	102½ —104½	..	4 6 2
Calcutta Trams, Ord.	5	6	7	6 3/8 — 6 5/8	..	5 5 8
Do. 5 % Pref.	5	5	5	4 1/16 — 5 1/16 xd	..	4 1 9
Do. 4½ % Deb.	100	4½	4½	99 —102 xd	..	4 8 3
Cape Electric Trams	1	Nil	2½†	3/8 — 1/2	..	..
City Buenos Aires Trams (1904)	5	5	5	5 1/16 — 5 1/8	..	4 10 6
Do. 4 % Deb.	100	5	5	99 —102 xd	..	4 18 0
Colombo Elec. Tr. & Lt., 5 % Deb.	100	5	5	94 — 98	..	5 2 0
Havana Elec. Rly., 5 % Bonds	$1000	5	5	100 —103	..	4 17 2
Kalgoorlie Elec. Trams	1	Nil	..	1/16 — 3/16	..	Nil
Do. 5 % A Deb.	100	5	5	89 — 90	—3	5 11 1
Do. 6 % B Deb.	100	5	6†	47 — 52	—8½	..

La Plata Elec. Trms, Ord.	1	..	..	1/2 — 3/4	..	..
Do. Pref.	1	6	6	29/32 — 1	..	6 0 0
Lisbon Elec. Trams, Ord.	1	5½	6	1 — 1¼	..	4 8 0
Do. 6 % Pref.	1	6	6	1 1/16 — 1 3/16 xd	..	5 1 1
Do. 5 % Deb.	100	5	5	91½ — 95½ xd	..	5 4 9
Madras Elec. Tr. (1904), Deb.	100	5	5	100 —102 xd	..	4 18 0
Manaos Trams & Lt., 1st Deb.	100	5	5	89½ — 92½ xd	..	5 8 1
Manila Elec. R. and Ltg., Bonds	$1000	5	5	103 —105	..	4 15 2
Mexico Trams Com.	$100	7	7	128⅛ —130½	—2	5 7 3
Do. Gen. Con. 5 % Bonds	..	5	5	98⅛ —100½	..	4 19 6
Do. 6 % Bonds	100	6	6	102 —104 xd	..	5 15 5
Para Elec. Rlys. & Lt., Ord.	5	10	10	6 7/8 — 7 1/8	..	6 18 0
Do. 6 % Pref.	5	6	6	5 — 5 1/8	..	7 0 4
Do. 5 % 1st Deb.	100	5	5	100 —102	..	4 18 0
Perth (W.A.) Elec. Tr., Ord.	1	2½	..	1 7/16 — 1 5/16	..	1 18 4
Do. 5 % 1st. Deb.	100	5	5	99 —102 xd	..	4 18 0
Rangoon El. Tr. & Sup., Pref.	5	6	6	5 1/4 — 5 3/8 xd	..	5 4 4
Do. 4½ % 1st Deb.	100	4½	4½	97 — 99 xd	..	4 11 0
Rio de Janeiro Trams	$100	4½	5†	152 —154	—4½	3 5 4
Do. 1st Mort. 5 % Bonds	..	5	5	103⅜ —104⅜ xd	..	4 15 6
Do. 5 % Mort. Bonds	100	5	5	99 —100	..	5 0 0
Sao Paulo Tram, Lt. and P.	$100	10	10†	288 —243	—12	4 2 4
Do. 5 % 1st Deb.	$500	5	5	105 —107	..	4 13 6
Singapore Trams, 5 % Deb.	100	5	5	82½ — 85½	+2½	5 17 0
Southern El. Tr. B.A., 5 % Deb.	100	5	5	97 — 99	+1	5 1 0
Un. Elec. Trams Monte Video	5	6	7	5 3/8 — 5 7/8 xd	..	5 19 2
Do. 6 % Pref.	5	6	6	4 3/4 — 5 1/8 xd	..	5 11 7
Do. 5 % 1st Deb.	100	5	5	100 —103	..	4 17 1
Winnipeg Elec. Rly., 4½ % Deb.	100	4½	4½	104½ —106⅜	..	4 4 6

MANUFACTURING COMPANIES.

Aron, Ord.	1	Nil	6	3/8 — 3/4 xd	..	8 0 0
Do. 6 % Pref.	1	9	6	7/8 — 1 1/8 xd	..	7 7 8
Babcock & Wilcox	1	26	28	3 1/4 — 3 3/8	..	..
Do. Pref.	1	6	6	1 3/8 — 1 1/2	..	4 0 0
B.I. & Helsby Cables	5	10	10	7 3/4 — 8 1/4	..	6 1 3
Do. Pref.	5	6	6	6 1/4 — 6 3/4	..	4 9 0
Do. Deb.	100	4½	4½	101 —103 xd	+2½	4 7 5
British Thomson-Houston, Deb.	100	4½	4½	96 — 98	..	4 11 10
British Westinghouse, Pref.	8	Nil	..	7/16 — 11/16	..	Nil
Do. Deb.	100	4	4	58 — 61 xd	—1	6 11 2
Do. 6 % Prior Lien	100	6	6	102 —105	..	5 14 3
Browett, Lindley, Ord.	1	Nil	..	2/- —3/-	..	Nil
Do. Pref.	1	Nil	..	4/6 —5/-	..	Nil
Brush, 7 % Pref.	2	Nil	..	0 — 1/4	..	Nil
Do. 5 % Prior Lien Deb.	100	5	5	75 — 80 xd	..	6 5 0
Do. 4½ % Deb.	100	4½	4½	52 — 57	..	7 17 10
Do. 4½ % Second Deb.	100	4½	4½	35 — 40 xd	..	11 5 0
Callender's Cable	5	15	10†	10⅜ — 11⅛	— 1/4	6 13 4
Do. Pref.	5	5	5	4⅜ — 5⅛ xd	..	4 17 7
Do. Deb.	100	4½	4½	98 —100 xd	..	4 10 0
Castner-Kellner	1	17½	20	32 — 33	+ 1/16	5 6 8
Do. Deb.	100	4½	4½	104 —108	+1½	4 10 7
Crompton & Co.	8	Nil	Nil	1/4 — 3/8	..	Nil
Do. Deb.	100	5	5	56 — 66 xd	..	7 11 6

Dick, Kerr	1	5	..	27/32 — 31/32	..	5 8 1
Do. Pref.	1	6	6	1 — 1⅛	..	5 6 8
Do. Deb.	100	4½	4½	95 — 98 xd	..	4 10 10
Edison & Swan, A, £3 paid	5	Nil	..	1/16 — 1/8	..	Nil
Do. fully paid	5	Nil	..	1 7/8 — 2 1/8	..	Nil
Do. 4 % Deb.	100	4	4	66 — 70 xd	..	5 14 4
Do. 5 % Second Deb.	100	5	5	75 — 78	..	6 8 2
Electric Construction	2	Nil	2½†	3/4 — 1	..	5 0 0
Do. Pref.	2	7	7	1⅞ — 2	..	7 0 0
Greenwood & Batley, Pref.	10	7	7	7⅞ — 8	..	8 5 8
Do. Deb.	100	5	5	92 — 94	..	5 4 2
General Electric, Pref.	10	5⅛	5	10 — 11 xd	+ 1/2	4 10 11
Do. Deb.	100	4 5/8	4	85 — 90	..	4 8 11
Henley's, Ord.	5	15a	10†	11⅜ — 12⅛	..	6 0 0
Do. Pref.	5	4½	4½	4 13/16 — 5 1/16	..	4 6 9
Do. Deb.	100	4½	4½	101 —103	..	4 7 5
India-Rubber, G. & T.	10	10	..	7⅞ — 8⅛	..	..
Do. Pref.	10	5	5	9½ — 10⅛ xd	..	4 17 7
Telegraph Construction	12	20	10†	32½ — 34½	..	6 17 0
Do. Deb.	100	4	4	98 —100 xd	..	4 0 0
Willans & Robinson	1	Nil	..	1/8 — 1/4	..	Nil
Do. Pref.	5	Nil	..	1/2 — 1	..	Nil
Do. Deb.	100	4	4	58 — 60	..	6 13 4

* Unless otherwise stated, all shares are fully paid. † Interim dividend.

Bank rate of Discount 3 per cent., May 9th, 1912.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING MAY, 1912.

THE May returns of electrical business show a satisfactory increase alike in exports, imports and re-exports, as compared with the preceding month's figures.

Thus the exports reached £428,655 in value, as against £403,328 in April, the former figure, it is true, including a bulky telegraphic export. The imports reached a total of £206,301, as against £198,038 in the preceding month, while the re-exports at £30,806 were more than £2,300 in advance of those for April.

The above export total compares with a monthly average of £384,000, approximately, during 1911; similarly the imports total compares with a 1911 monthly average of £206,000 approximately.

Machinery exports during the month showed a considerable decline, as compared with April, this being true in a lesser degree as regards cable exports. Some improvement was, however, shown in most of the other sections of the exports.

On the other hand, machinery imports rose during the month to over £100,000 in value, and telegraphic imports were doubled, while the cable imports fell away by half.

The premier position amongst this country's customers for the month fell to Canada, due to a large telegraphic purchase, while Japan's high total was due to activity in telephonic matters, as was the case in April.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.

Destination of exports and country consigning imports.	Electrical goods and appliances.	Wires and cables, rubber and other insulations.	Electric lighting fittings and accessories.	Electric glow lamps.	Electric arc lamps and lamp parts.	Electric meters and instruments.	Electric machinery.	Electrically-driven machinery.	Batteries and accumulators.	Carbons.	Telephonic cable and apparatus and electric bells	Telegraphic cable and apparatus.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	1,445	2,852	158	81	75	143	3,519	672	243	137	320	641	10,286
Germany	1,886	1,958	19	...	746	...	1,003	31	4	130	...	...	5,777
Netherlands, Java and Dutch Indies ...	562	1,175	467	16	29	60	271	231	...	...	590	...	3,401
Belgium	329	1,868	179	...	137	175	2,531	340	15	209	1,007	162	6,952
France	1,204	73	1,225	111	69	3	9,494	1,227	14	68	107	28	13,623
Portugal	243	12	...	88	...	30	21	8	20	...	110	82	614
Spain and Canary Isles	488	778	22	79	...	418	7,897	60	...	...	...	...	9,742
Switzerland, Italy and Austria-Hungary ...	391	33	89	12	30	...	2,219	1,053	107	424	34	1,368	5,760
Greece, Roumania and Turkey	33	252	140	...	132	7	251	...	291	...	103	1,913	3,122
Channel Isles, Gibraltar, Malta and Cyprus...	49	15	49	64	102	22	65	17	3	...	89	275	730
U.S.A., Philippines and Cuba	359	...	63	445	...	...	889	...	177	31	227	624	2,815
Canada and Newfoundland	1,349	4,231	1,020	2,193	...	3,657	13,274	436	241	12	447	36,477	63,337
British West Indies and British Guiana ...	220	227	340	31	75	99	335	...	...	11	43	15	1,396
Mexico and Central America	79	...	7	...	...	43	202	...	1	...	715	169	1,216
Peru and Uruguay	98	46	32	20	...	48	517	20	456	...	327	1,884	3,448
Chile	383	101	217	109	27	4	1,691	...	47	39	141	6,394	9,153
Brazil	774	1,317	579	522	142	532	3,184	2,075	302	71	1,941	2,840	14,279
Argentina	1,847	8,038	1,079	857	324	575	5,634	3,427	1,468	290	2,283	614	26,436
Colombia, Venezuela and Bolivia	8	33	4	223	...	8	265	9	112	...	...	2,508	3,170
Egypt and Persia	900	473	89	142	...	146	504	198	801	...	64	330	3,647
British West Africa and St. Helena... ...	91	206	18	23	16	...	195	...	133	...	30	324	1,036
Rhodesia, O.R.C. and Transvaal	2,687	1,158	618	4,288	...	911	3,332	...	2,124	61	1,380	247	16,806
Cape of Good Hope	1,528	5,164	306	938	35	190	2,740	410	3,172	28	276	887	15,674
Natal	875	4,677	1,319	506	81	92	2,348	...	177	24	26	427	10,552
Zanzibar, Brit. E. Africa, Liberia, Mauritius and Aden	193	142	51	728	...	228	462	46	58	24	97	2,090	4,119
Azores, Madeira and Portuguese Africa ...	137	457	49	103	...	...	319	275	87	...	86	163	1,676
French African Colonies and Madagascar ...	...	...	...	11	...	...	29	...	...	...	...	198	238
China and Siam	1,556	1,384	875	1,893	20	194	605	...	475	...	314	236	7,552
Japan and Korea	2,060	22,589	373	58	...	2,934	7,765	1,612	216	...	12,228	3,205	53,040
India	118	7,426	6,625	2,089	516	2,083	8,628	3,560	1,293	236	652	779	34,005
Ceylon	398	270	232	114	22	52	1,251	12	93	4	48	52	2,548
Straits Settlements and Fed. Malay States	311	1,519	131	97	...	892	986	...	118	...	165	351	4,570
Hong Kong	1,151	145	201	411	...	229	371	...	285	59	41	446	3,339
West Australia	263	755	127	356	385	42	259	155	48	11	138	764	3,303
South Australia	101	1,419	63	...	...	336	1,620	4	1	29	6,728	...	10,301
Victoria	1,572	4,825	1,581	1,831	...	67	3,003	239	1,333	...	2,702	8	17,161
New South Wales	2,562	8,710	378	1,333	57	207	13,607	767	708	...	51 5	376	29,220
Queensland	576	236	63	242	...	147	1,079	2,643	85	8	693	891	6,663
Tasmania	83	...	8	30	...	...	...	...	...	...	...	...	121
New Zealand and Fiji Islands	1,175	2,722	735	922	...	343	2,180	5,362	320	...	1,720	2,328	17,807
Total, £	30,084	87,286	19,531	20,966	3,020	14,917	104,545	24,889	15,028	1,906	36,387	70,096	428,655

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

Russia, Norway, Sweden and Denmark ...	652	...	...	100	...	12	4,807	360	636	...	7,594	14,161
Germany	1,718	4,981	1,577	15,216	3,850	1,809	71,727	12	2,294	4,107	18,866	126,157
Holland	...	...	17	227	502	...	55	330	...	...	232	1,363
Belgium	314	1,531	59	7	20	68	1,412	152	54	782	6,211	10,610
France	...	18	1,136	1,319	610	155	557	...	1,498	3,145	1,248	9,686
Switzerland	193	1,528	102	19	47	...	1,286	...	8	16	738	3,937
Italy	17	3,515	...	...	...	...	2,021	...	...	...	1,640	7,193
Austria-Hungary	...	1,504	...	353	122	...	...	...	15	362	85	2,441
United States	3,701	1,358	677	264	1,232	53	12,055	9,380	63	45	1,575	30,403
Total, £	6,595	14,435	3,568	17,505	6,383	2,097	93,920	10,234	4,568	8,457	38,189	205,951

Additional imports: Spain, carbons, £350.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

Various countries, mainly as above ...	23,046	690	...	622	287	...	5,202	...	336	467	156

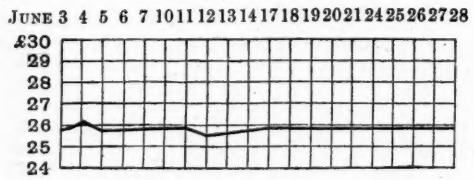
TOTAL EXPORTS: £428,655. TOTAL RE-EXPORTS: £30,806. TOTAL IMPORTS: £206,301.

NOTE.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns. Imports are credited to the country whence consigned, which is not necessarily the country of origin.

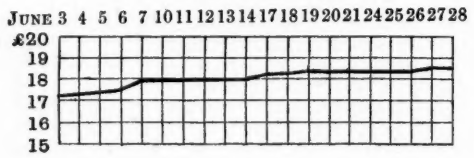
METAL MARKET.

Fluctuations in June.

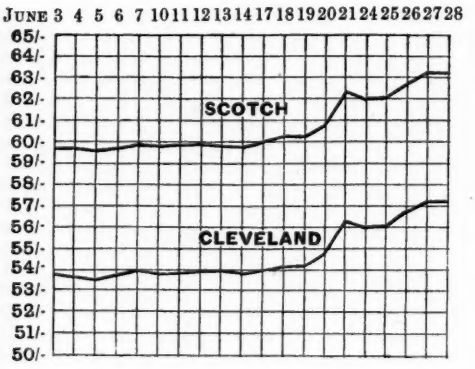
SPELTER (G.O.B's.)



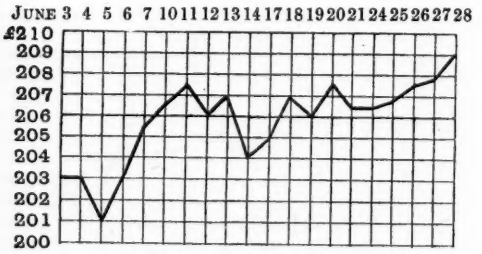
LEAD (ENGLISH).



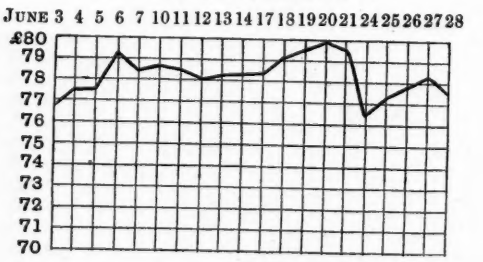
IRON.



TIN.



COPPER (G.M.B's.).



Barrow-in-Furness Lighting.—At a recent meeting of the T.C., it was decided that the electrical engineer should replace 13 arc lamps in Abbey Road, Ramsden Square and Duke Street by 50 100-volt lamps suspended from the tramway span wires, in a similar manner to that adopted in the greater portion of Abbey Road. Six "Beacon" flame lamps, which had been used experimentally in Dalton Road, were ordered to be retained, and three other lamps were ordered to be replaced by "Beacon" flame lamps.

AUSTRALIAN TRAMWAY COMPANIES AND THEIR EMPLOYÉS.—VI.

THE conditions of employment in the Melbourne tramway system were next inquired into. Mr. Mitchell, a trackman, said he had recently received an increase from 7s. 6d. to 8s. per day. The claim asked for 10s. per day. Horse-car drivers wanted 60s. per week of 48 hours. Under the Carters' Board award they were to receive 50s. for a week of 52 hours. It was stated that the company's Act stipulated for a 48 hours' week, but that until the Union drew attention to the fact they worked a 54 hours' week. Mr. Simmons, an engine driver at the company's power house, stated that his ordinary pay was £2 14s. per week, and that with half-time extra for Sunday work, it amounted to £3 per week. He wanted 14s. per day, or £4 4s. per week of 48 hours.

Mr. O'Shea, a shed foreman, who received 10s. per day, claimed 14s. per day. A night foreman receiving £3 per week, asked for 14s. or £4 4s. per week of 48 hours. An engine driver who, after 25 years' service, received £4 per week, thought he ought to get £5. A lamp trimmer receiving £2 2s. per week of 48 hours, wanted £2 14s. A car washer getting £2 per week, thought he ought to get as much as a car cleaner. A shunter getting £2 2s. 6d. per week, wanted £2 14s. Mr. Greenough, a tunnel cleaner, paid at present £2 a week, claimed £4 4s., but could give no satisfactory reason to account for the difference. A conductor claimed that the present method of occasional employment called "battling" should be abolished, and that at least a fortnight's holiday on full pay should be given. Some time was then taken up in examining a witness who stated that he lived in a house owned by the company. Originally he had free quarters, but since a wage board determination which awarded him 45s. a week, rent had been charged on such a sliding scale that the extra due to him under the award for higher pay and overtime was deducted for rent.

The case of the workers on the Ballarat system then came under consideration. Mr. Pringle, for many years borough electrical engineer at Burton-on-Trent, is the manager of this undertaking. The claims made were very general, and resembled in substance those already referred to. Conductors received 5s. 4d. per day, and motormen 6s. 8d. per day; they wanted 11s. per day and a fortnight's leave of absence per annum on full pay after 12 months' service. It was admitted that Mr. Pringle made no difference in his attitude towards unionists or non-unionists, but still the men pressed their claim for preference to be given to men belonging to their organisation. Reference was then made to a case in which it was alleged that the Melbourne Tramways Co. had brought pressure to bear on one of their receivers to induce him to resign membership of the men's union.

The men were then asked whether they expected a full day's pay in the case of a car breaking down as it was leaving the station, and there was no further work for the driver and conductor. The men's reply was "Yes," as the breakdown was not their fault.

The men asked for further time to complete their preparations for showing the serious rise in the cost of living which had recently taken place, and it was agreed that a later opportunity should be given for this to be produced. One of the men's witnesses, a conductor on the Essendon tram service, was seriously pressed as to the practicability of enforcing the whole of the men's claims. He admitted that it was largely a question of resources, as the cost of working under the proposed conditions would be very high. Asked how he would find work for all the workers so as to abolish split turns, he was quite unable to do so.

A further instance of the impracticability of some of the claims was afforded by the appearance of Henry Burton, a youth of 18, receiving 31s. per week for boiler cleaning after 7½ months' experience. He claimed 12s. a day, or £3 12s. a week. The Judge pointed out at once the inconsistency of asking 12s. a day for a youth after a few months' experience and 11s. a day for a motorman or conductor after as many years.

This practically closed the men's case, except the submission of proof as to the cost of living. The Prahran and Malvern Tramway Trust tried to get the case as against themselves dismissed, on the ground of there being no dissatisfaction on their system, but the Judge intimated that it would have to go on. They then called their chief inspector, who stated that he considered the present rates of pay—8s. 4d. per day for a fortnight of 96 hours—sufficient. There was no general discontent, though, no doubt, the men would like the 11s. per day asked for.

Keighley Lighting.—A statement submitted to T.C. last week showed that it was considered that the approximate surplus on the last year's working, though only £3, was satisfactory in view of the coal strike and serious water shortage. A working cost on the year of ·39d. per unit, in comparison with ·75d. in 1910, represented a saving of nearly 50 per cent. Total expenditure of ·55d. per unit was compared with neighbouring municipal undertakings' figures of ·52d. at Leeds, ·82d. at Halifax, and ·95d. at Shipley. Were it not for heavy debt on original plant, the department would show a net profit of about £2,500, but at present something like that amount was paid in interest and sinking fund on plant which was of no use at all.

THE SWANSEA CONGRESS OF THE TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

WE look always to the T. and L. R. Association to provide a satisfying programme at its annual meetings, and we have not yet been disappointed.

It is true that the papers which were read at the Congress held on June 27th and 28th do not, as a whole, contain very much that could not be recognised by anyone who is gifted with a particularly retentive memory; but, in our opinion, they are none the worse on that account.

The tramway industry is now well established upon principles which have remained unaltered for some years, and even in practical working details there has been little movement to record; but there are many aspirations still unreached, many abuses still unremedied; and many tramways which have not risen to the current standards of excellence. Therefore, papers which may not be more than a digest, and a re-iteration, of facts and opinions already accepted by the higher or more alert intelligences of any industry, serve nevertheless a most useful—nay, an indispensable—purpose, by bringing before all of us in an authoritative and permanent form, a concentration of many scattered publications.

In the absence of the Hon. Arthur Stanley, M.P., chairman of the Association, who should have presided at the Convention, the chair was occupied by Mr. Harry England, the vice-chairman, and right well did he carry out his duties. Terse and to the point, he did not waste words for the mere sake of talking, nor did he omit anything which could have had any practical bearing upon the position he held. The able manner in which he presided over this important gathering, which officially, and excluding local guests, numbered 177, will not readily be forgotten by those who took part in the meeting.

The organisation, too, which from beginning to end of the Congress, with its many social functions, showed a masterhand, may, we assume, be credited mainly to the urbane and ever courteous secretary, Mr. de Turckheim, whose duties were anything but a sinecure, and to him, to Mr. James, and the Association we offer our hearty congratulations on a success which, but for the part played by the Clerk of the Weather on the first day, would not have offered a single excuse for a grumble on the part of even the most hardened and cynical misanthrope.

Mr. A. H. Pott's contribution to the proceedings was the first in order, length and importance. It was a very fair and temperate comparison of the public value of tramways, 'buses and railless cars, and it may serve to revive again (if that be necessary) the crusading spirit which has fought so strenuously, and, withal, so unavailingly, against the pressure of restrictive legislation.

The tenour of Mr. Pott's argument is that there is a place in the sun for all three systems of road traction; that the limitations of each system are defined with some clearness; and that without unfair handicapping the tramway would show to more advantage against the 'bus than it does under present conditions.

It is well that all of us should recognise the fact which has been patent for some years that the development of the motor-'bus is not going to be retarded simply because it may be disagreeable to a number of tramway owners. The history of the motor-'bus has been one of surprisingly rapid development in the face of considerable difficulties, and we should be the last to begrudge the pioneers their meed of praise. At times, no doubt, the champions of the motor-'bus have seemed to exceed the limits of fair controversy in their efforts to anticipate facts; but, speaking generally, they have fought well, and they cannot be blamed for turning to their own use any of the laws and regulations which have hampered the full and proper development of tramways.

We notice with surprise that the Board of Trade, in the 1911 Report of the London Traffic Branch, has taken some pains to prove the motor-'bus superior to the tramway with respect to cost, without giving due weight to the arguments of the other side, although we should hesitate to go so far as Mr. Pott in surmising that a certain basis of comparison was taken to enable this conclusion to be reached.

Tramway owners have raised, and still maintain, the most strenuous objection to the clauses which saddle their undertakings with the cost of maintaining all but the margins of the roads, and they are, undoubtedly, more than a little sore that motor-'buses in direct competition are exempt from such liability. The petrol tax was designed to provide a fund for the improvement of roads, and owners of 'buses contend that this tax is equivalent to the burden on the tramways. The Board of Trade states that a comparison on these lines between the London General Omnibus Co. and the L.C.C. tramways gives the following results:—

L.G.O. petrol tax = 0·009d. per seat-mile
L.C.C. rates on track = 0·008d. „

thereby demonstrating that if anyone is treated unfavourably it is the 'bus owners.

We want to know, with Mr. Pott, why the seat-mile basis was adopted, when obviously the car-mile is the proper divisor as road repairs are under consideration. The figures have a very different appearance if the car-mile is used:—

L.G.O. ... ... 0·312d. per car-mile
L.C.C. ... ... 0·589d. „

In arriving at an approximate comparison of working costs for tramways and 'buses, Mr. Pott considers that he has a right to omit the rates paid on track work with the exception of rails, and to reduce the permanent-way renewals and paving repairs in the same manner; while on the other side he deducts the petrol tax. Without these adjustments the comparison reads:—Tramway, cost per car-mile, 8·02d; 'bus, cost per 'bus-mile, 7·460d. Having made the adjustments, the comparison becomes:—Tramway, 6·97d.; 'bus, 7·16d.

We must remember that however equitable these adjustments may be, they serve only at the present time the purpose of giving us all a brick to throw at the Legislature; and the fact remains that Mr. Pott's figures prove that the motor-'bus can, under favourable conditions, be run at a lower working cost (including interest on capital) than the tramcar, and that is not a thing which many of us were prepared to admit before. We may as well state here Mr. Pott's estimates of capital cost:—Tramways, £7,000 per car, or £21,000 per mile; 'buses, £1,350 per car, or £4,000 per mile. All that must be very gratifying to the exponent of the beauties of transit by motor-'bus, but there is another side of the picture, of which the tramway enthusiast can make full use.

In the first place, the comparisons have been drawn on the basis, we understand, of a five minutes' service.

Secondly, Mr. Pott has assumed, "in many instances," that the traffic conditions in the streets of London are typical of traffic conditions in towns generally.

Thirdly, the motor-'buses have been assumed to run over streets equal to the lightly graded, well-paved London streets.

Fourthly, the ratio of *fatal* accidents in London during 1911 as between motor-'bus and tramcar, based on the same number of vehicles, was 6 : 1.

Lastly, the bodily and mental comfort of a ride on a tramcar is said to be in excess of that experienced upon a 'bus. That is the only point put forward in favour of tramcars, which is entirely a matter of opinion, and it is included merely for what it is worth.

Evidently it is easier now to write an article favourable to motor-'buses than it was five years ago; and, as we said above, the owners are to be congratulated upon the very great success which has attended their efforts, but Mr. Pott is doing a public service by placing in our hands a compact and well-reasoned indictment of the laws which have permitted the expenditure of £75,000,000 upon tramways and light railways, but refuse legitimate protection to that enormous capital sum when competitors arise who are not hampered and restricted at every turn.

If the margin of profit on the working of tramways were abnormally large we could not expect in these anti-capitalist days to arouse much popular sympathy; but the reverse is notoriously the case; and, while the tramway owners are not so mean as to wish their competitors to be loaded with vexatious and costly burdens, they do plead that a juster

balance may be granted by the removal of unique burdens from their own shoulders.

There is something very wrong when the following tale can be told :—

There are cases where the local authority is not the road authority, but receives a contribution towards the maintenance of roads from its County Council. Therefore, when a tramway is laid, the C.C. is relieved by the Acts under which the tramways are constructed of a contribution to road maintenance proportionate to the area occupied by the tramways, and local authorities are now discovering that it may be better where a single track is laid to augment the car service by running railless cars over the tramway route rather than double the track. (Mr. Pott's paper.)

That is humorous enough in its way, but, from the point of view of the public, and altogether apart from the interests of tramway owners, it indicates the existence of an evil which ought to be remedied.

Mr. Pott thinks that traction by trolley 'bus (unsuitably styled "railless traction" as a distinction) falls into a position midway between trams and 'buses, being more flexible and mobile than a tramway, but less so than a 'bus. He puts down the capital cost at £1,670 per 'bus, or £5,000 per mile of railless route ; and he estimates the working cost (20 to 30 vehicles) at 6·06d. per 'bus mile. He has made use of all available statistics in arriving at these figures, but it would be well not to take the working cost too much for granted until the system comes into more general use.

Mr. Pott believes that the trolley 'bus system is most suitable for extending transit beyond a tramway terminus, provided the road is good, and that a minimum service of 15 minutes can be maintained.

We suggest that the real intention of the Light Railways Act is more likely to be carried out by means of a system such as the trolley 'bus than by steam or electric tramways, or motor-car and lorry services. Attention should be paid to this solution of the former's chief trouble.

Our attitude in relation to the whole question of tramways, motor-'buses and trolley 'buses can be summed up shortly.

Under existing conditions, new tramways cannot be constructed with hope of reasonable profit, therefore the greatest possible use should be made of the motor-'bus or of the trolley-'bus, according to circumstances, by the tramway owners themselves ; but, in view of the great hardship caused to existing and heavily capitalised, immovable, tramways by comparatively unrestricted, lightly capitalised, and removable motor-'bus undertakings, Parliament should be moved to reduce the handicap to a more equitable figure.

(*To be continued.*)

THE Tramways and Light Railways Association held its annual Congress at Mumbles on Thursday and Friday of last week. The pier pavilion had been placed at the disposal of the Association for the purpose, and about 150 members were present.

In the absence of the chairman (the Hon. Arthur Stanley, M.P.) the chair was excellently filled by Mr. Harry England (the vice-chairman), who was supported by members of the Council, the Secretary (Mr. A. de Turckheim), and other officials.

MR. TEGETMEIER, as chairman of the Swansea Improvements and Tramways Co., at the outset extended to the members a hearty welcome.

In opening the Conference the CHAIRMAN said he thought it would be their wish that the papers should be practically taken as read, and the discussion be begun almost at once.

MR. A. H. POTT, M.Inst.C.E., chief engineer of the Metropolitan Electric Tramways, Ltd., then introduced his paper on "The Respective Value of Tramways, Motor-'buses and Railless Traction as Means of Transport."

MR. POTT explained that the figures of cost were based very much on London figures, but he had tried to bring up the cost of railless traction and motor-'buses to the same standard, and if they increased the one they must increase the other, and *vice versâ*. The question of legislation, however, he regarded as the most important part of the paper.

MR. CLOUGH (Bury) said the paper was largely based on conditions which only existed in the metropolitan area. Referring to the capital costs, which the author stated were calculated on a five-minute service, if they had to consider the respective values of the various means of transport, it would not be in districts where the five-minute service could be run, but in sparsely-populated districts ; and instead of representing the cost of the tramway at £21,000 per mile, he thought Mr. Pott ought to have taken the cost of a single track. If, as the author said, it was necessary to take steps to make tramways more profitable and to approach Parliament for the purposes he named, they must be prepared with a reasonable scheme. He could not agree with the author when he said that none of the expense of street widening should go against the tramways. After having been allowed to lay rails in the public streets with the object of cheapening the cost of working their tramways, could they seriously suggest that they should be entirely relieved from their obligations in order to place them in a better position to compete with the later means of transport ? It was an interesting fact that at a more recent date than horse traction, and when companies were seeking permission from local authorities to construct steam tramways, one of the strongest arguments then used was that companies would keep a large proportion of the main roads in repair and that the lines would be rated. As regarded the class of paving, in the provinces they had not suffered in the same way, but a good case could be made out for some assistance in meeting the extra expenditure which in recent years had fallen upon tramways owing to the excessive wear and tear of the tramway paving by motor vehicles, which conveyed over the tramway paving a great weight of goods which had been diverted from the railways. Often alongside the rails there were patches of paving which had sunk a couple of inches, invariably caused by water getting under the rail and the underbed of the paving being pumped out. If the road authority had to repair the paving, what would be the use of it unless the rail repairs were carried out at the same time ? If they were to secure an alteration of Clause 28 of the 1870 Act they must be prepared with a workable scheme.

In the paper the author gave the cost of power for railless traction as 0·66d. per car-mile. Were they to understand that the energy per car-mile was 34 per cent. less in the case of railless traction than in the case of a tramway ? Rubber tires were given at a penny per car-mile. At the Dublin Conference in 1910 Mr. Pott stated that tires for railless traction would cost anything from 1½d. to 2½d. per car-mile, and he (the speaker) agreed with this opinion. It was important to know that those figures for railless showing the total of 6·06d. per car-mile were only estimated, and he thought the author was wrong in his conclusion that, provided only a 15 minutes' service was justified, the best travelling facilities could be given by railless traction. They now knew that the working of the railless traction system at Leeds had cost more than the figure given by Mr. Pott, and that at Bradford the total cost had been 7·626d. per car-mile. He contended that to give a 15 minutes' service, even under present legislation, a tramway could be run cheaper than the railless system.

ALDERMAN IVEY (West Ham) said that Mr. Clough, in the comparisons he made, quite forgot that in 1910 Mr. Pott was dealing with the cost of tires generally all over the country, whereas he was now dealing with it from the metropolitan standpoint. He agreed, however, with Mr. Clough that if there was any need for a further provision of transport they had far better use a few motor-'buses than go in for railless traction. The best thing to do was to try the motor-'bus of the very lightest character, and build up their traffic so that in time they would need, and would have, a proper tramway. He thought the only duty that ought to be saddled on the tramway was as Mr. Clough said—though not in so many words—the maintenance of the rails, joints and foundations ; the rest should be put on the highway authority. The Bill that had been introduced would, he hoped, become an Act of Parliament such as tramway managers could use to some advantage.

MR. J. B. HAMILTON (Leeds) thought he had never looked over a paper which contained more thoroughly-reasoned and well-balanced views than those Mr. Pott had presented, and he generally agreed with his conclusions. In London the motor-'bus had the very obvious advantage of the centre portion of London, in which there was a feeding point which made it impossible for tramways to compete on anything like the same conditions. Tramways were an impossibility in the centre of London. Moreover, the motor-'buses were enabled to go further out, and therefore at both ends of the route the tramways were enormously handicapped. But this did not obtain in provincial towns, and for that reason the comparison was not very conclusive on the general question. The motor-omnibus under exactly the same conditions would be an unsuccessful competitor. He agreed with Mr. Clough that those who felt the pinch should bring forward a definite scheme as to what portion, if any, of the road making should be borne by the public transport undertaking, whether a tramway company or a municipal undertaking, and some thoroughly established views could be put in a concrete form with which they might possibly knock at the Parliamentary door for some redress. Wherever a motor-omnibus could go through narrow streets, it was equally possible for the mobile railless car to go. Where an infrequent service was required, the very first essential was reliability, and he did not consider that the motor-omnibus was anything like sufficiently reliable in an infrequent service for those in charge of public transport facilities to depend upon it. He could assure Mr. Clough that the cost of energy in the case of railless traction was not 34 per cent., but 50 per cent. less than in the case of a tramway, and he could show him a contract with a notable firm, in which the contractor gave 1d. per car-mile for rubbers for railless traction. He gave the figures to Mr. Pott, and they were actual figures, and not supposition. In the case of the motor-omnibuses, beyond the published statements, they knew no more than what they did before, and he hesitated very much to advise any tramway man who desired to feed his system to consider the motor-omnibus until more definite facts came before him. The installation of railless traction put in at Leeds had worked with entire satisfaction. It was not put there with any idea of financial return, but to serve a district of the city which the Corporation thought it necessary to provide for, and it had amply and thoroughly fulfilled that want at the very lowest possible cost

ALDERMAN RODGERS (Newcastle) said Mr. Hamilton spoke about the reliability of the railless trolley as compared with the motor-'bus. Was that Mr. Hamilton's true experience in Leeds? At another conference Mr. Hamilton stated that the cost was 6·20d. and 6·47d., and he admitted at that conference that that did not include his proportion of management expenses. They had a statement with regard to Bradford at the same time. The cost of the railless trolley there was 7·26d. Even at that he did not think they had got to the bed rock bottom of the cost of the trackless trolley. Messrs. Tilling & Co., who had had 3¾ years' experience of the new electric motor-'bus, had scrapped 300 of their old 'buses and were going to replace them by 300 electric motor-'buses, and their cost was 6¾d. per c.m. inclusive of everything and scrapping the 'buses in five years. He thought that that was a very satisfactory state of affairs. They had adopted the motor-'bus in Newcastle. They tried to get the powers for the railless trolley on two routes and for motor-'buses as well. The Parliamentary Committee would not let them run the railless trolley outside their own area unless they undertook to pay for the road maintenance, and the result was it had to go out of their Bill. They got the powers for the motor 'bus for the same route without any road maintenance being mentioned at all. The capital charges of their motor-'buses was £850 per 'bus, and they saved the £1,250 per mile of overhead equipment. They had been running four weeks and doing excellent service.

MR. HAMILTON, with regard to the figures given for railless traction, explained that the circumstances were different. In Leeds their working expenses were calculated on an effective speed of 8½ m.p.h., whereas in Bradford, it was only 5½ m.p.h. The cost of the vehicles was exactly the same, but Mr Spencer's figures included a certain proportion for management and other expenses. But his own figures were equally correct.

MR. SIDNEY E. GARCKE (London) said the comparison between the costs of the motor-omnibus and railless traction in Table A was not quite fair. They had had only a short experience of the railless traction, and the probability was that sufficient time had not elapsed to enable them to arrive at a proper figure for wear and tear. He thought ·66d. rather low for power, and he could not see why the maintenance of the railless trolley car should be materially less than for the motor-omnibus. He saw no reason why the administration, insurance and other charges should be so much lower in the case of the trackless trolley—he thought they would be higher; and in regard to accidents, why should one be put at ·400d. and the other at ·10d.? He also thought Mr. Pott had put down the interest on capital for the motor-omnibus out of proportion to the others. He put the motor-'bus at £1,350, but £1,000 was ample. He brought the motor-omnibus total to just over ¼d. higher than that for the trackless trolley, and said that if that was the only difference he felt that the motor-omnibus held its own, because it had the advantage which could not be strictly shown in figures and being sent on different routes. Those interested in tramway enterprise should treat the motor-omnibus seriously, and tramway companies should be first in the field to establish motor-'buses in their districts outside their areas.

MR. GEORGE BALFOUR (London) suggested the addition of two columns to the tables, one bringing the cost of the omnibus operation up to the same basis as the tramcar as regards capacity, and another bringing railless traction up to the same basis as the tramcar. In other words, if they multiplied the cost for railless traction by two, they then had something like a true comparison with the cost they had in the first column. The whole question was how many people could be carried for a given amount of money, and it was idle to compare the cost of a trackless trolley with that of a tramcar carrying 50 people, for at once they found the cost was out of all proportion. On the question of road widenings and road maintenance, in his view as long as they were rated on the present basis they should be entirely relieved of all costs of road maintenance except in so far as the upkeep of the paving immediately adjoining the rails. Mr. Clough mentioned that it was quite impracticable to separate the item of maintaining the paving on either side and between the rails, but he might tell him that he (Mr. Balfour) had had it in operation. They paid the municipal authority a lump sum and took the responsibility of maintaining the paving on either side of the rails. He thought the most important change that they ought to try for was that they should be rated on the hereditable things only, but if the present system of rating continued the difference between the two methods should be applied entirely to the cost of maintaining the road.

MR. WHITE (Grimsby) said he had been working motor-'buses at Grimsby for the last four years. He found from experience that the maintenance of the engine costs about twice as much as that of the chassis. Sixty per cent. of his rubber tires had given him as much as 20,000 to 22,000 'bus miles, and, therefore, the cost per 'bus of 1d. was certainly ample. He thought the item of 0·3d. for maintenance of bodies was too high. His insurance on his motor-'buses was £20 per 'bus as compared with £16 per car, third party risk. And, therefore, that item should be considerably reduced. He agreed with Mr. Balfour that the costs should have been per passenger mile and not per 'bus mile, because the tramcar naturally carried relatively double the number of passengers compared with either the moter-omnibus or the railless trolley. In Grimsby they preferred the motor-'bus to the railless trolley.

The CHAIRMAN then closed the discussion, and, in reply to a vote of thanks,

MR. POTT explained that the object he had in view was to bring forward the point that more legislation was really required to help the tramways, but the discussion had turned chiefly on the relative merits of the railless traction and the motor-omnibus. The omnibus figures were correct, and not estimated, but as regarded tramways, they were estimated on certain London undertakings.

MR. CLOUGH then read a paper on the use of car meters.

MR. A. A. BLACKBURN (Belfast) said that in Belfast they had a most complete system of instruction for both motormen and conductors, and it must not be forgotten that conductors played a very important part in saving current. Their methods depended entirely on keen, efficient road supervision. They now found many undertakings investigating troubles that should have been discovered long ago, and would have been had engineers had the problem to contend with. Apart from making grants of money to both motormen and conductors, they had recently introduced a profit-sharing system, in which all tramway employés received an equal share.

MR. W. H. EDWARDES (Atherton) said it was a debatable point whether a bonus system for workmen was desirable. They (in South Lancashire) paid their men a good wage—some people considered it rather too high—and such men ought to do their work properly and efficiently without any offers of bonus. Mr. Clough said car meters were of very little use unless there were bonuses for the lowest consumption, but he could not agree with him. A bonus system, no doubt, induced a man to save more current than he really should. It was a most difficult matter for the manager to hit on the happy mean of current consumption. Personally, he considered car meters essential, and he could not understand the manager who thought otherwise.

MR. R. HUMPHRIES (Birmingham) said that if a system was capable of a reduction in units per car-mile from 1·8 to 1·2, he would be very chary of placarding such a result to prove what a horrible state it must have been in before. Car meters were not the secret of success in every way. Mr. Clough said: "In seeking to eliminate all waste, you will bring your cars up to such a state of efficiency that in addition to a reduced energy bill, you will have a large saving from secondary causes which will amply repay you." It did not take a meter to find that out. Overhauling and periodical inspections carefully done in the shops were the proper methods. He took it that at least 90 per cent. of the benefit a meter of any kind had on a car was to teach a motorman how to coast, and a very simple device he had had attached on the 200 cars under him was the clock meter, which was much used on the continent. They were fixed up at a cost of 10s. per car, and by their use they had got down, he took it, to bedrock economy. On the Birmingham and Midland system they had got down from 1·4 to 1·2 units per c.m. on one, and on the other from 1·4 to 1·3. And if the car system was looked after thoroughly and the plant overhauled, that was as much economy from the motorman as one could expect, if the men were doing their duty to the passengers on the line. He remembered a case of three meters in a station that were all going fast, and when overhauled and standardised, there was 25 per cent. difference in the reading to what it was before. There were many directions where economy could be effected other than in car meters. In outlying lines where feeders had been cut down to a minimum, there was a good deal of energy lost and it would pay for a little capital to be invested in feeders.

MR. DUGDALE (Oldham) said his energy consumption used to be 2·5 units per car-mile; to-day it was 1·7; and that had all been brought about by taking statistics and watching each man in his energy consumption. It had also assisted him in finding out the cars that were taking the most current. Those were put on one side and overhauled piecemeal thoroughly. During this financial year they had a saving of £700 already on energy consumption, and last year with their bad cars they saved £760.

MR. TEGETMEIER (Swansea Tramways Co.) said the question of car meters was a very important one, and the companies he had been connected with that had adopted them had never seen any reason to regret doing so. He considered car meters an essential addition to a tramway undertaking. The Swansea service was a difficult one to work owing to the considerable gradients and very frequent stoppages, and they had very big and crowded cars. The energy consumption was 1·44 units per car-mile, which was reasonable certainly compared with what had just been said. The consumption was now 1·21, thanks to the introduction of car meters. He thought bonuses were unnecessary, and he would almost say they were somewhat degrading to the men.

MR. E. E. SHARP (Messrs. Venner & Co.) said that on the question of bonus, he had gathered experience from a large number of undertakings, and, generally speaking, he thought bonuses had been rather a failure. The trouble was that those who did not get bonuses made their voices heard. The leading makers offered to put meters on cars for six months, and if they did not prove satisfactory to take them back. That seemed an answer to every objection. Mr. Clough seemed to think that everybody now had meters, but he was wrong, and the worst sinners were the bigger systems. Mr. Blackburn, he thought, had not taken into account the cost of the inspection, and that when the car was going through the shops the car was useless. That represented money value, and if they had a meter they could find out what was the matter on the first day. Mr. Humphries had also discovered a cheap system, but he did not know whether he knew that that system on the Continent was very nearly dead, whilst as regarded the 10s. arrangement, of course they could not buy a decent clock for that sum. An inspector could not be on every car, whereas a meter could be.

The CHAIRMAN here closed the discussion, and moved a vote of thanks to Mr. Clough for his paper.

MR. CLOUGH, in reply, disagreed with Mr. Blackburn that it must have been inefficient management before the meters were introduced. It was not the regular annual overhauling that he referred to so much as to the little things that crept in each night and took the "juice" the next day. It was then they saw the

difficulty of inspection, and it was in those little alterations of the car that the meter would show what was wrong. If Mr. Humphries, with his 10s. instrument, could bring the figure down from 1·4 to 1·2, he was just the gentleman who could do with a good meter—he would save 30 or 40 per cent.

This concluded the first Congress sitting.

Luncheon on the Pier.

At the invitation of the chairman (Mr. Tegetmeier) of the Swansea Improvements and Tramways Co., the members of the Association sat down to an excellent luncheon, provided in the pier pavilion. Mr. Tegetmeier presided, supported by the Mayor of Swansea (Mr. E. S. Protheroe) and little Mayoress (Miss Mildred Protheroe), Sir Griffith Thomas, Chairman of the Swansea Harbour Trust, Mr. England and others.

The toast of "The Tramways and Light Railways Association" was submitted from the chair, and Mr. Tegetmeier said it was appropriate that the Conference was being held in Swansea, where the relations that existed between the Tramways Co. and the Corporation (which owned a portion of the undertaking) were of such a cordial and harmonious character.

The toast was heartily received, and Mr. England responded, making reference to the benefits derived from such assemblies and thanking Mr. Tegetmeier and Mr. D. James, the local manager, for their efforts to make the congress successful and enjoyable.

In consequence of very wet weather an afternoon drive was abandoned, and instead, the members were entertained with a concert in the pavilion, by the "Brownies."

In the evening the Mayor and Corporation of Swansea entertained the members to dinner at the Hotel Metropole. The Mayor presided, and during the evening Councillor H. J. Rodgers (Newcastle) and Alderman Brown (Leeds) paid a warm tribute to Swansea's hospitality to the Association.

(To be continued.)

LEGAL.

Perfecta Seamless Steel Tube and Conduit Co., Ltd., *v.* G. E. Taylor & Co.

On Friday the Court of Appeal, composed of Lords Justices Vaughan Williams, Fletcher Moulton and Buckley, had this case before them. The plaintiffs appealed from a judgment of Mr. Justice Pickford at Birmingham.

Mr. Atkin, K.C., for the appellants, said that Mr. Justice Pickford gave judgment for the defendants for the sum of £162 on their counterclaim with costs. The plaintiffs, a Birmingham firm, sued the defendants, electrical engineers, of London, to recover £403 for goods sold and delivered. The defendants said that in respect of 81,000 ft. of the metal tubing supplied, £97 was overcharged, the plaintiffs having, as was asserted, charged a higher price than the contract price. Defendants further said that the plaintiffs had failed to deliver 26,700 ft. of tubing, and that, in consequence, they had had to buy on the market, involving an additional expenditure over the contract price of £64, and for this sum they counterclaimed. Defendants admitted liability for £241, and the dispute at the trial was whether the plaintiffs were entitled to an additional £97, and whether the defendants on their counterclaim could recover £64. Finally, the learned Judge gave judgment for the defendants on the counterclaim for £162, which was manifestly wrong, because the plaintiffs had never been paid the £97.

Mr. Joy, for the defendants, agreed that the form of the judgmen was wrong, and that if the plaintiffs did not persist in their claim for £97, the judgment must be rectified by reducing it by that amount.

Mr. Atkin said that being so the only real point between them was the construction of the contract. The plaintiffs were manufacturers of steel tubing, and the defendants electrical engineers, who entered into contracts for the installation of electric light, and so on. On January 16th, 1910, the defendants gave an order to the plaintiffs, which was accepted by their London manager, "for the supply of solid drawn tubes required during the year 1910." The plaintiffs' contention was that that contract did not give the defendants an unlimited power to buy any quantity of tubes, but that all they were entitled to order were tubes which they required for use in their business during 1910.

Mr. Justice Pickford took the view that the contract was limited to the defendants' requirements during 1910, and the controversy between the parties was whether the tubes in question were required for use in 1910. From time to time the defendants sent in specifications and the plaintiffs delivered in accordance with those specifications some 160,000 ft. of metal tubing from January to November in 1910. In December there was due for delivery, and was in fact delivered, a further 44,000 ft. On December 6th, 1910, defendants sent in two specifications amounting together to 87,500 ft., to be delivered within 21 days. Plaintiffs, in reply, wrote that they could not see their way under the circumstances to undertake the supply of the tubing as they did not consider that the goods could be required for use during the remaining days the contract had to run.

Lord Justice Buckley: I suppose the price of tubing had gone up?

Mr. Atkin: Yes, my Lord.

Lord Justice Moulton: A prudent contractor when he gets a job guards himself against rise in price by buying material for the job.

Lord Justice Buckley: Is the only point between you whether "required" means "required for use during the year" or "required for use for an impending contract?"

Mr. Atkin: Yes. My submission is that goods required for use in 1911 did not come within the contract, and that, therefore, the plaintiffs were not under an obligation to supply them.

Without calling upon counsel for the respondents,

Their Lordships dismissed the appeal with costs subject to rectification of the figures by reducing the amount of the judgment on the counterclaim from £162 to £64.

Foster Bros. *v.* Electric Construction Co.

In the King's Bench Divisional Court on Friday, Mr. Justice Ridley and Mr. Justice Bucknill had before them, in the Civil Paper, the appeal of plaintiffs in the action Foster Bros. *v.* Electric Construction Co. from the decision of Judge Howard Smith, on the counterclaim in the action. The plaintiffs were Messrs. Foster Bros., of Birmingham, and the defendants the Electric Construction Co., of Wolverhampton.

Mr. Ward said the present appellants were the plaintiffs in the action, in which they sued for the balance due on a contract to supply certain fittings for a barometric condenser at the works of the Wolverhampton Corrugated Iron Co., Ltd. The defendants admitted the claim, and counterclaimed for damages for alleged breach of contract. They alleged that the plaintiffs had contracted to supply a pump for the barometric condenser. On this point, the learned Judge found for the defendants, and awarded them £14 15s. The plaintiffs did not supply pumps, and this was known to defendants. The original contract had been for the supply of a jet ejector, which did not necessitate a pump, and when the matter was altered, new specifications had to be submitted for the barometric condenser, which did not include a pump. In the work, which cost £171 3s., was provision for an exhaust pipe, and on that supplied by the plaintiffs was a T joint, to which was attached a drain cock. It was necessary in order to work this that a pump should be placed over the drain cock. But plaintiffs did not supply these pumps, and it was not in the specification. The defendants said in the County Court, "You agreed to supply us with a proper installation, but we found we had to provide this pump, and we charge you with breach of contract in not supplying that."

Mr. Justice Bucknill said apparently if a round instead of a sharp bend had been provided, the pump would have been unnecessary.

Mr. Ward said this was not provided for in the specifications, and in fact it was not part of the plaintiffs' trade to supply pumps.

Counsel pointed out that, in the jet ejector condenser, the plaintiffs contracted to supply a complete installation. In the second contract, however, they were more careful, and only contracted to supply the pipes and certain accessories, and an automatic trap was not included. In the Court below, said Counsel, he wanted to call Mr. Foster, but, from what the learned Judge said, he (Counsel) thought Mr. Foster would not be believed, so he called no evidence.

On the last point, Mr. Sturge, for the respondents, said the learned Judge never refused to hear the witness, and he never said he would not believe the witness if called.

The Court said the witness should have been called in the Court of first instance. The Court could not send the case back for further inquiry. On the general matter, their Lordships agreed with the finding of the learned Judge on the evidence before him.

The appeal was dismissed, with costs.

Tramcar Accident Claims.

The hearing concluded on June 27th at the Durham Assizes, before Mr. Justice Eldon Bankes and a special jury, of the action brought by Miss Sarah Pym, dressmaker, of West Hartlepool, to recover £150 damages for personal injuries from the South Shields Corporation.

Mr. Meynell was for the plaintiff, and Mr. Scott Fox, K.C., and Mr. Simey for the defendants. The case was heard at the previous Assizes, but the jury then disagreed.

Mr. Meynell, for the plaintiff, said complainant undoubtedly received somewhat severe injuries by reason of her fall from the defendants' tramcar. The issue was whether that fall was due to the negligence of the defendants, or whether, as the defendants alleged, it was caused by Miss Pym attempting to get out of the tramcar while it was in motion.

In the result, the jury found for the plaintiff for £145 damages.

Before Lord Hunter and a jury, in the Court of Session on Friday, the trial was concluded of an action by Mrs. Catherine Gibb, widow, against the Edinburgh and District Tramways Co., for £2,000 in respect of personal injuries. The pursuer alleged that the lower part of her skirt was caught by a vertical stay on the right side of the car, or became jammed between the main stay and the body of the car. She was, in consequence, thrown violently to the ground and dragged for some distance along the causeway on

her face, and a wheel of the car passed over her left leg, the injury necessitating an amputation. She contended that it was the duty of the defenders to have had both the vertical stay and the main stay guarded, but this they failed to do. The defenders denied fault, and pleaded contributory negligence. There was no necessity for any such guards as the pursuer suggested (they contended), and the introduction of such would be both impracticable and dangerous in view of the construction of defenders' cars. A model of a cable car, provided by the company, was produced.

MR. JAMES BENNETT, of Edinburgh, said he had seen the projection at the foot of the vertical rod on the car, which was concerned in the accident, and he considered it quite possible that a woman's dress might be caught by the projection. A car with such a projection was not safe. The effectual way to obviate an accident of this kind would be to put on a screen. There would, however, be one little inconvenience in this, in that it was sometimes necessary to push back cable tramcars with crowbars, and if a screen were erected it would be in the way. As a result of his inspection of various types of cars, he had come to the conclusion that the need for protecting the space below the cars and between the bogies was becoming more generally recognised than it used to be, and while Corporations like Newcastle, Blackpool and Burnley had gone in for providing side screens, others had got over the difficulty to a large extent by protecting the inner faces of the bogie wheels. If such precautions had been taken by the Edinburgh Tramway Co., the accident to Mrs. Gibb would have been prevented. Cross-examined, Witness admitted that apart from the present action and another, he had never known of any accident alleged to have been caused by a projection on the side of the Edinburgh tramcars. He was not a member of the Tramway Association, and was not aware that that body had never discussed the question of side guards. With one exception, the Witness continued, he had not seen any type of car with so much unguarded open space as the Edinburgh cars had.

MR. A. H. CAMPBELL, Corporation engineer, gave it as his personal opinion that some side guard was necessary for the Edinburgh cars. Replying to Lord Hunter, he said he had never known of any accident occurring through the absence of the side guard.

MR. R. W. HOGARTH, consulting, mechanical and electrical engineer, was of opinion that some fencing was required for the space from the front to the rear wheels. He saw no difficulty in applying to the Edinburgh cars the same principle as that adopted in connection with the Liverpool cars.

MR. G. W. CRAWFORD, consulting engineer, Edinburgh, said that last year Edinburgh cars killed as many people as the cars of Glasgow, Aberdeen, Leith, and Dundee put together. In Glasgow the cars ran at a much higher speed, went about three times as far, and carried four times as many people as the Edinburgh cars. This line of evidence was disallowed by the Judge.

For the defenders, MR. ANDREW WILSON, Edinburgh, said the Edinburgh car was much safer than any he had seen in respect of the tendency to touch or catch clothing; there was no projection to touch the clothing of a person standing near the car. Witness described experiments he had carried out, and which he held proved that there was no sucking-in influence exerted by a car as it passed, and he could not see any possible way in which a skirt could be entangled.

MR. BENJAMIN HALL BLYTH, chairman of the company since 1894, gave it as his opinion that it was impossible that there could be suction at the front or side of a tramcar. The vertical stay at the side of the car constituted no danger at all. The side guard suggested by the pursuer would project 2½ in. from the body of the car, and would cause a real obstruction, which might be a danger to the public. The directors of the company had taken the best advice available, and their only anxiety was to find out something better than they had got at present.

MR. C. W. SHEPHERD, manager of the company, spoke of the money spent by the company in experimenting in lifeguards. His attention having been called to the statement that it was impracticable to fit the guard to a car, the manager explained that it was impracticable to guard the whole of the side of the car.

MR. H. E. BLAIN, tramway manager of the borough of West Ham, and President of the Municipal Tramways Association, said he thought accidents would be aggravated by the presence of side guards.

The jury returned a unanimous verdict in favour of the Tramway Co.

NORTH METROPOLITAN ELECTRIC SUPPLY CO. SUMMONED.

THE North Metropolitan Electric Supply Co. was summoned at Highgate Police Court on June 26th, before Sir Alfred Reynolds, for that they being occupiers of a certain factory within the meaning of the Factory and Workshops Act, 1901 and 1907, to wit, the sub-station at Woodberry Grove, Finchley, were guilty of an offence against Sec. 18 of the Regulations of 1908 made for the generation, transformation, and distribution and use of electrical energy that when work was being done by A. R. Shapcot on the switchboard, the switchboard was not so arranged that work could be carried on without danger. The second summons charged the company with employing a person not being an authorised person or competent person over 21 years of age, to undertake cleaning, such being work where technical knowledge or experience was required.

Mr. Hunter Gray prosecuted, and Mr. Bodkin defended.

MR. GRAY said the first summons had regard to the proper protection of an electric installation so as to prevent injury or loss of life. This case was at the sub-station at the North Finchley tramway station, and as a result, he alleged, of the non-compliance with these rules and regulations, a boy of 18, named Arthur Reginald Shapcot, was killed by an electric discharge. Finchley was a sub-station. The pressure at which the current came in was 10,000 volts. Before it was used for tramway purposes it was transformed down to 500 volts. Mr. Gray explained the switch arrangement. The wire in the vicinity of the isolating switch was covered, but as it passed through the current transformer it was surrounded by porcelain tubing which should meet and cover the rubber wires. It did not, however, and there was a little bare place. On March 25th Shapcot was working under a man named Styles, cleaning and standing on the oil cell, when his body came into contact with the bare part of the conductor, and he was killed. Styles, who set the youth to do the work, observed him most of the time. It was suggested that Shapcot should have done all the work from the right-hand box, but he (Mr. Gray) thought that they would find from the dimensions that he could not have done it. On the other hand, he could have been on the box with absolute safety if the isolating switch had been open. It was not open. It would have been still safer had the whole been disconnected, which could have been done. That was one provision made by Rule 18D. The whole thing could be made dead, or if it were going to be made dead in sections, it must be divided or screened off, so that no carelessness would cause anyone to be hurt whilst working there. He should have said that this was the three-phase system, and anyone would get about 6,000 volts. In this case there were neither permanent nor removable screens or divisions. Rule 28 provided that no person except an authorised person or a competent person should undertake any repair, extension, cleaning or such technical work. This youth was 18 or 19 years of age, and had been with the company 9 or 10 months. He was not an authorised or competent person over 21 years of age.

MR. THOS. GEO. STYLES said Shapcot worked under him, and witness understood that he had had training at Tottenham Institute. Once in three weeks, the switch limits were cleaned. Shapcot was told to work at the switch cells on the right. The oil cells were about 6 ft. high and the distance between the two oil cells was about 2 ft. 6 in. After Shapcot had cleaned the right oil cell, he went to the left oil cell, and the accident happened there. The isolating switch was closed, and there were no screens. The pressure limits were cleaned every week, but he only did it once in three weeks. It was always done at night, and each man had to have an assistant. Witness was quite satisfied to have Shapcot as his assistant.

MR. BODKIN produced a scale model, which was shown to the Bench, being placed on the dock. Witness said Shapcot could have stood on the girders or angle bars or right on top of the bus-bar coverings with perfect safety. For any work he had to do it was not necessary for him to be anywhere but on the right-hand range and the top of the bus-bars. At the inquest, the jury exonerated witness from all blame. Witness thought that Shapcot was able and competent to do the work that he was set to do He did not know how he got across to the left-hand cell, and witness thought it was partly a matter of speculation as to whether it was easier to get across by stepping over or by getting down, crossing to the left-hand cell, and climbing up again.

MR. RAM, Home Office Inspector, said he had visited the station. He could get across under the bus-bars from one oil switch to the other with ease. A person standing on this particular oil switch would be in reach of the bare piece of wire.

MR. BODKIN said he was pursuing that subject because Shapcot had probably been out of the line of vision of Styles just before the accident. Had he stepped across the cells he would not have gone out of the line of vision, and therefore, he (Mr. Bodkin) believed that he got down and got up again on the other side. That concluded the case against the company. Mr. Bodkin said that the prosecution affected the methods adopted by numerous other electrical power supply companies in different parts of the kingdom. This was the first time that either of those regulations had been discussed, and the Highgate justices had another opportunity of breaking fresh ground in law. They had to assign a reasonable interpretation to the regulations, and he did not hesitate to say that they would have great difficulty in interpreting them. Mr. Bodkin went on to argue that it was the duty and liability, solely and entirely, of the workmen, and from the beginning to the end the employer was not mentioned in the regulation. It was the workman who was forbidden to undertake the work, unless he was an authorised or competent person. He (Mr. Bodkin) submitted that Shapcot was an authorised person for he was selected by the company, or their representative, to perform certain duties, and those duties were to do this cleaning under the direction of Styles, about whom no question was raised at all. What Shapcot did was practically to deliberately move the screen, if there had been one, to get into what he thought was a more easy position for cleaning.

MR. PERCY M. HUNT, engineer in charge of the sub-station, cross-examined, said the sub-station had two feeders. He admitted that the one main could easily have been made dead.

MR. GRAY: And you could still supply your tramways?—Yes.

MR. GRAY: I put it to you, he was not in such a convenient position to clean one side of the limit resistance from the left-hand side as he would be if he were working from the other side?—He could clean the whole easily from the left-hand side.

In answer to MR. BODKIN, the Witness said that in his opinion the provisions in force complied with Regulation 18.

MR. ARTHUR HY. POTT (engineer-in-chief to the tramway company): He thought the arrangement of the apparatus complied with the regulations. It was perfectly possible to clean the carbon resistance from the top of the bus-bars, or by sitting astride on one of the angle irons. That was absolutely safe. By putting a division between the right-hand series of cells, and the cells on the left hand, he thought they were complying with the regulations.

He considered Shapcot capable of doing the work allotted to him. Witness pointed out to Mr. Gray that it was possible to make one of the mains feeding the station dead, but he pointed out that the other main might break down, and the result of that would be that the trams would be stopped, and the lights go out.

MR. RUTHVEN MURRAY, engineer-in-chief to the Power Co., also gave evidence.

SIR ALFRED REYNOLDS, in giving the decision of the bench, said: We consider that the occupiers are liable, and also say that Shapcot, in our opinion, was not an authorised person. On the summons against Rule 18 we fine the defendant company £25, and we give costs of £5 5s. On the summons under Rule 28 we make a nominal fine of 40s. and the Court costs.

BRITISH WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., LTD., *v.* UNDERGROUND ELECTRIC RAILWAYS OF LONDON, LTD.

THE House of Lords on Monday last concluded the hearing of an appeal by the plaintiffs in this action from a decision of the Court of Appeal (Lords Justices Vaughan Williams, Buckley and Kennedy) in December last. The previous hearing was reported in the ELECTRICAL REVIEW for December 8th, 1911.

The question arose with reference to certain turbines and generating machinery supplied by the plaintiffs in connection with the supply of electricity for the defendants' railway plant. The matter went to arbitration, and a motion was made to a Divisional Court (Justices Pickford and Lush) in June of 1911, to set aside the Arbitrator's award. The Court feeling bound by a previous decision of the Divisional Court upon certain points of law that had been submitted, dismissed the motion

By a majority of the Court of Appeal, that decision was upheld, and the House of Lords now reserved judgment.

THE TELEPHONE ARBITRATION.

(*Continued from Vol.* 70, *page* 1067.)

MR. DANCKWERTS, K.C., said the counsel for the Postmaster-General had intimated that the figures given on the previous day by Mr. Goddard would not be taken as proved unless the gentlemen who helped in their preparation were called. That would involve the appearance of about 100 witnesses, all of whom were now employed in the Post Office.

His LORDSHIP said the Court had indicated that opportunity should be given to a representative of the Post Office to go into all these matters with the persons who prepared the tables. The Postmaster-General would then know what particular facts he desired to be proved.

MR. DANCKWERTS acquiesced in that course, and said he would ask the Solicitor-General to give instructions for such investigation to take place speedily.

The SOLICITOR-GENERAL said he did not desire to put the other side to the trouble of calling 100 witnesses. If he were informed of the names of the gentlemen who had carried out the investigation, he would see that the necessary inquiry was made.

SIR ALFRED CRIPPS said that there was so much to be done outside the Court that he would ask the Commission not to sit on the Monday following.

This request was granted, it being supported by the Solicitor-General.

In the course of a subsequent discussion on the claim with regard to the freight charges for the carriage of plant, &c., from the manufactories, it was admitted that the company had made a mistake respecting the main rates charges, and his Lordship said that meant a reduction of about £30,000 on one item.

MR. FRANK GILL, the engineer-in-chief to the company, was then recalled to give evidence on the question of the freight charges. During the course of his evidence, Sir A. Cripps said that in connection with these charges there was a difference between the company and the Post Office of only 1d. over a very large area.

MR. GODDARD was recalled for cross-examination, and was examined with regard to a figure of £4,404,000 which was given as expenditure on plant for a period of six years. A table was put in by the company showing that the total expenditure on capital account for the period 1895 to 1910 was £11,085,070, and on revenue account £15,340,255. Witness calculated that £504,000 was the average cost of plant for one year.

SIR J. SIMON: Is it not the company's case that the figures in their books for capital expenditure are not true because they have charged to revenue account what really ought to be charged to capital account?—That is so.

Therefore the figures in your books should be larger?—Quite so.

Do you think, then, £504,000 for one year is a fair figure to take to arrive at your percentage for plant cost for a year?—I am afraid I cannot answer that question.

With all your desire to assist the Court by your knowledge, cannot you say whether or not the figure of £504,000 is within a quarter of a million of a fair average for one year's plant cost?—I think it is.

Counsel asked witness to take the six years' capital charges from 1905 to 1910-11. Having added up this total, witness said it came to £5,080,247.

The SOLICITOR-GENERAL: That is so. Now, you see in the year 1905 the figure for plant cost was £30,000 short of £1,000,000; in 1906 it was over £1,000,000; in 1907 it was over £1,000,000, and in 1908 it was over £750,000.—Witness agreed with these figures.

SIR J. SIMON: Do you still say, then, that £504,000 was a fair figure to take as a year's average cost for plant?—It all depended on the period which was taken.

Do you agree with me that a substantial part of the expenses do not vary?—Yes.

And if you take that part, do you not see that the percentages you seek to produce are all false, if you have taken an abnormally low year of plant cost?—Yes, if I have done so.

Do you or do you not agree that you have taken an abnormally low year?—No; I do not think I do. It depends whether I am to be confined to the six years' average. If I am, my answer is "Yes, I have taken an abnormally low figure," but I do not think, upon the 11 years' construction, which is the period upon which the company's claim is based, that the £504,000 is an abnormally low figure.

Then we will test that answer. Take the figures for the five years before 1905; the total cost for that period amounts to £3,477,000, giving a figure of £8,557,249 for the 11 years. Now, if you divide that, you will see that the average cost per year works out at £778,000?—That is so.

Therefore, the substitution of 11 years for six years does not help you out of your difficulty. Do you now agree that the figure of £504,000 is abnormally low?—Witness eventually agreed that the figure of £504,000 would probably turn out to be a lower figure than was actually the case. Of course, witness added, there was the additional cost of line repairs to be considered.

Accepting witness's last answer, the SOLICITOR-GENERAL asked him to take the six years' cost of plant construction and line repairs added together?—Witness agreed that the total under the two heads for that period amounted to £5,643,500.

SIR J. SIMON: Now, if you divide that by six you get a year's average of £940,600?—That is so.

But the yearly average according to your figures is £734,000. Is that not also an abnormally low average?—If one is wrong all are wrong. Later witness explained that the figures, he had now been informed, were only estimates.

The Solicitor-General next dealt with a figure of £80,578 which was included in the capital account under replacement charges. He submitted that that figure should really be a great deal more, and proceeded by an enormous number of complicated queries to witness to try to analyse the way in which the figure was arrived at. Eventually this became another matter to be left over, with a view to the experts on both sides investigating it out of court.

Respecting the figures given for replacements, it was arranged that certain items under that head should be gone into by the accountants for the respective parties, and a table prepared.

SIR ALFRED CRIPPS said if that were done he hoped to be able to complete the company's case by the end of the next week.

Mr. Goddard's cross-examination having concluded, SIR ALEXANDER KENNEDY gave evidence in support of Mr. Gill's figures. With regard to tendering for a large contract, witness said that a contractor who had to raise several millions would have to incur interest on the borrowed money as well as the expense of raising the loan. That would all come within contractors' charges. Continuing, witness said that Mr. Gill's estimate of 30 years for the life of underground armoured cables was, in his opinion, rather short. Twenty years for vulcanised rubber cables was reasonable. He had put down a cable of that description 25 years ago, and when it was taken up recently it was found to be perfectly good. In reckoning for depreciation, allowance had to be made for scrap value.

MR. DANCKWERTS: It has been suggested that the cost of maintenance increases with the life of the plant?

WITNESS: I do not think that is really true in respect of the greater part of telephone plant. In the matter of poles and wires, for instance, there is no increased maintenance. Either the pole is there doing its work or it is not. Cases of switchboards and portions of plant, where, on the face of things, a question of maintenance would come, have been allowed for by reason of the fact that the parts which require maintaining have been taken at extremely short lives—2½ and 3 years. Of course, if questions relating to revenue were allowed to come into the matter, he would point out that the company's plant in most cases had a greater earning capacity than was the case when it was put down. For instance, a pole when it was put up might only carry 10 wires, but after five years it might be carrying 30 wires. He understood, however, that such revenue considerations were barred from the valuation.

(To be continued.)

The Horsfall Destructor Co., Ltd.—Owing to very heavy litigation in connection with thrashing machines sent to the South of Europe to the order of an English firm, which resulted unfavourably to the company, the latter found itself unable to meet its obligations, and a few weeks ago Mr. A. W. Wyon was appointed receiver and manager on behalf of the debenture-holders. We are authorised to state that Mr. Wyon is carrying on the business at Atlas Works, Pershore, and that he is making arrangements for the carrying out of any destructor contracts entrusted to the firm, with the assistance of a well known and very strong firm of contractors. The services of the skilled staff of the company are available, and it is hoped at no distant date to re-establish the concern on a substantial basis.

Patent Application.—Application has been made for restoration of patent No. 23,725 of 1907 for "A new or improved recording mechanism for engine-room telegraphs and the like," by Oswald Dean.

ELECTRICAL TRADES BENEVOLENT INSTITUTION.

THE following is the list of contributors for the six months ending June 30th, 1912 :—

d Ferranti, S. Z.de	£10	10	0
s Berry, Skinner & Co.	1	1	0
l s Electromotors, Ltd.	2	2	0
m Anderson, A. Bruce	2	2	0
s Ferranti, Ltd.	5	5	0
m Bishop, O. H.	1	1	0
s Ruberoid Co.	1	1	0
s Samuelson, G. B.	2	2	0
s Ashton, H. M.	0	5	0
l s Electrical Review	10	10	0
m Courtenay, Sir Irving	5	5	0
s Pilkington Bros.	1	1	0
s Hunt, R., & Co.	1	1	0
m Alston, W. W.	0	10	0
m Kapp, Dr. Gisbert	1	1	0
d Moul, H. E.	1	1	0
s Stolzenberg Patent File Co.	1	1	0
m Baugham, A. H.	0	10	6
s London Electric Firm	1	1	0
d Indestructible Cable Co.	1	1	0
m Barkham, C.	0	10	6
d Morris, Alex.	0	10	0
s Venner & Co.	1	1	0
s Chaplin & Co.	1	1	0
d Thacker, F. C.	0	10	6
s Tudor Accumulator Co.	2	2	0
m Marshall, E.	0	10	6
s Home & Rowland	1	1	0
d Pollard, Wm., & Co.	0	10	6
d Farmer, R. H.	0	10	0
d Waddie & Co.	0	10	6
d Eller, E. W.	0	10	0
d Cook, A. G. H.	0	5	0
d Brown, R.	0	2	6
d Stagg & Robson	1	1	0
d Hardy & Padmore	0	10	6
d Mosers, Ltd.	0	10	0
d D. P. Battery Co.	0	10	6
d Nixon, J., & Sons	0	5	0
m Kaye, H. Neville	0	5	0
m Swinton, A. A. Campbell	2	2	0
s Electricity	1	1	0
d Internat. Trade Exhibit.	5	5	0
m Ireland, A. J.	1	1	0
d Battison, W. A.	1	1	0
d Assersohn, D.	0	10	6
s Essex Accumulator Co.	1	1	0
s Rawlings Bros.	2	2	0
s Price, E. L., & Co.	1	1	0
s Carless, Capel & Lennard	1	1	0
s Wiggins & Co.	0	10	6
s Crapper & Co.	0	10	6
d Spencer, Sir Ernest	1	1	0
d Bond, W. G. A.	1	1	0
d Burton, Col. H.	1	1	0
m Fletcher, J. Y.	1	1	0
m Wolfe Barry, Sir J.	2	2	0
m Devonshire, Jas.	2	2	0
d Birmingham Light Co.	1	1	0
s Whitehouse, Wm.	0	10	6
d Cranmer & Cheshire	1	1	0
d Atlas Carbon & Battery Co.	1	1	0
d Taylor, Tunnicliffe & Co.	1	1	0
d Kiesow & Co.	1	1	0
d Henderson & Walker	0	10	6
d Mehne, J. G.	1	1	0
d Barwell, Jas., Sons & Co.	0	10	6
d Peach, J. C.	1	1	0
m Madgen, Wm. L.	1	1	0
d Quitman, Carl	1	1	0
d Watlington & Co., Ltd.	0	10	6
d Carbon Paper Supply Co.	1	1	0
s Sloan Electrical Co.	2	2	0
s Conradty, C.	3	0	0
s Unwin Bros.	1	1	0
s Crampton & Sons	0	10	6
s Cantie Switch Co., Ltd.	1	1	0
d Taylor, C. E.	5	5	0
s Lind & Co.	1	1	0
s Griffiths Bros.	2	2	0
d Champion, C. H.	0	5	0
d Whitfield Tan Co.	0	10	6
d Putney, Samuel, Ltd.	0	5	0
d Plumtree, J. S.	0	10	0
s Jandus Arc Lamp Co.	2	2	0
d Wardroper, A. K.	0	2	6
d Blundstone, S. R.	1	1	0
d Fells, J. M.	1	1	0
s Straus, G., & Co.	2	5	0
s Jaeger Bros.	1	1	0
d Atkinson, Llewellyn B.	1	0	0
s Hornsby, Richd., & Sons	1	1	0
m Esson, W. B.	2	2	0
m Wallis-Jones, Regd. J.	1	1	0
d Hooper, John P.	5	5	0
s Berridge, Geo., & Co.	2	2	0
d Von Chauvin, G.	2	2	0
s Blackburn, Starling & Co.	2	2	0
s Thompson, W. P., & Co.	1	1	0
s Manifold Printing Co.	1	1	0
s Percy Lund	0	5	0
s Sterling Tele. & Elec. Co.	3	3	0
m Burney, Guy	2	2	0
s Concordia Elec. Wire Co.	3	3	0
s Ward & Goldstone	3	3	0
d Middleton, V. G.	1	1	0
m Koettgen, C.	5	5	0
s Davidson & Co., Ltd.	1	1	0
m Kingsbury, J. E.	2	2	0
s Preece, Cardew & Snell	2	2	0
m Davenport, W.	1	1	0
s Digby, Thos.	5	5	0
s Tegetmeier, C. G.	1	1	0
d Ollivant, Sir E. C. K.	2	2	0
d Rainsford, T.	1	1	0
d Lundberg, A. P., & Sons	1	1	0
d Potter, W. and J.	1	1	0
d Plutte, Scheele & Co.	1	1	0
m Baker, G. T.	1	1	0
s Croggon & Co., Ltd.	1	1	0
d Hill-Jones, T.	£1	1	0
d Holmes, F. J.	1	1	0
d Farmiloe, F. & W., Ltd.	1	1	0
d Becker, R., & Co.	1	1	0
d Spies Bros. & Co.	1	1	0
d Foster, Cawson & Co.	1	1	0
d Locke, Lancaster & Co.	1	1	0
d Berthold, A., & Co.	1	0	0
d Anonymous	0	10	6
d Hewetson, H., & Co.	6	10	6
d English Bros.	0	10	6
d Bolton, Geo., & Son	0	10	6
d Rogers, S.	0	10	6
d Brundle, F. H.	0	10	6
d Groves, J. & N.	0	10	0
d Gilson, D., & Co.	0	10	0
d Fenner & Alder, Ltd.	0	10	0
d Bishop, S. & C.	0	5	0
l s Gray, Jas. Hunter	10	10	0
d Heilbut, Symons & Co.	5	0	0
d Symington, Wm., & Co.	2	2	0
d Alden, A. H., & Co.	1	1	0
d Meyer, Arthur	1	1	0
d Teleg. Cons. & Main. Co.	5	5	0
d Pugh, Ed., & Co.	1	1	0
s Begg, F. Faithfull	1	1	0
s Marryat & Place	2	2	0
l m Sutton, G.	10	10	0
d Morse, Sydney	2	2	0
d Lax, Herman Strasse	1	10	0
m Waterhouse, L. M.	1	1	0
s Sugden & Hextall	1	1	0
d Barr, Morring & Co.	1	1	0
d Hill, Fredk., & Co.	0	10	6
d Saltrick, Ada	1	1	0
d Cook, W. W.	1	1	0
m Hammond, Robt.	1	1	0
d Ellisor, Geo.	1	1	0
s Holophane, Ltd.	2	2	0
s Bates, W. A.	0	2	6
d Icke, J. R.	0	2	6
d Meyer, Arthur & Co.	5	5	0
m Judd, Walter	1	1	0
m Schmahl, W.	2	2	0
d Marchant, H. F.	1	1	0
d Dwyer, F. L.	1	1	0
d Dow, J.	1	1	0
d Spear, F. B.	1	1	0
d Jeary, W. C.	1	1	0
d Plummer, J. S. B.	1	1	0
d Tong, G. E.	1	1	0
d Goddard, J. P.	1	1	0
d McDougall, Jas., Ltd.	1	1	0
d Spicer & Pegler	1	1	0
d Armorduct Mfg. Co.	3	3	0
d Sun Electrical Co.	5	5	0
s Beaver, A. G.	1	1	0
d Ritchie, T. E.	0	10	0
d Charles & Dible.	1	1	0
d Glaholme & Robson	0	5	0
d Eck, Justus	2	10	0
d Garbe Lahmeyer & Co.	2	0	0
d Hartmann & Braun	2	0	0
d Körting & Mathiesen	5	0	0
d Avery, John H.	0	10	6
d Leftwich, A.	0	10	0
d Schumann, Miss, and Assistants	0	13	0
d Herr, Miss H.	0	5	0
s Lynen, R.	2	2	0
d Buck & Hickman	1	1	0
s Leaf, H. M.	1	1	0
d Crump, Frank, & Co.	2	2	0
d Moulton, Rt. Hon. Lord Justice F.	1	1	0
s Willcox, W. H., & Co.	2	2	0
d Krausse & Auerbach	2	2	0
d Union Cable Co.	2	2	0
d Goulding, T. W.	2	2	0
d Thurnauer, L.	2	2	0
m Lichtenstein, P.	0	10	6
l s General Electric Co.	15	15	0
l m Hirst, H.	10	10	0
d Byng, E. G.	5	5	0
d Byng, L. G.	5	5	0
d Railing, M.	5	5	0
d White, S. D.	1	1	0
m Rawlings, W. R.	1	1	0
m Mason, A. V.	1	1	0
d Pirelli, Alberto	2	2	0
d Broacha, Sir S. B.	5	5	0
d Chalk, Walter	1	1	0
d Wolf, A.	0	10	6
d Bevis, H.	1	1	0
d Shepperd, J.	1	1	0
s Lundberg, A. P., & Sons	2	2	0
m Hoare, W. H.	0	10	6
m Thomson, A.	0	10	0
m Kaye & Neville	0	5	0
d Huddleston, J. Snow	1	1	0
s Concordia Elec. Wire Co. (Staff)	1	1	0
s Benson, W. A. S., & Co.	0	10	6
s Handcock & Dykes	1	1	0
d Brit. Ever-Ready Elec. Co.	2	2	0
m Wild, L. W.	1	1	0
s Reid, Ed. J.	1	1	0
m Trotter, A. P.	1	1	0
s Pope's Elec. Lamp Co.	1	1	0
s Crompton & Co.	2	2	0
m Hughman, R. W.	1	1	0
m Kolle, H. W.	2	2	0
s Lawton, John, & Sons	1	1	0
d Electrical Engineers' Ball, Committee of	20	0	0
l s Brit. Thomson-Houston Co.	10	10	0
s Espir, Fernand	1	1	0
s British Traders' Assoc.	3	3	0
m Clothier, H. W.	0	10	6
m Lawrence, A.	0	10	0
d Hawkins Bros. & Co.	1	0	0
l m Prestige, J. Theo., jun.	10	10	0
m Clark, E. J.	1	1	0
m Hay, G.	1	1	0
d Pilkington Bros.	0	10	6
d Kidd, G. W.	0	10	6
d Gill, A. B.	5	5	0
s Traun, Dr. Hein, & Sons	2	0	0
d Traun, Dr. Hein., & Sons	3	0	0
d Moseley, D., & Sons, Ltd.	3	3	0
d Harburg & Vienna I.R. Co., Ltd.	2	2	0
d Pirelli, Ltd.	2	2	0
s Hurst, A., & Co.	2	2	0
d Nettlefold & Sons, Ltd.	2	2	0
d Cookson & Co.	1	1	0
d Wallach Bros., Ltd.	1	1	0
m Baldwin, J. H.	0	10	0
s Wiggins, F., & Sons	1	1	0
m O'Meara, Major W. A.	1	1	0
s Kearsley, Robt., & Co.	1	1	0
s Green, F. A.	1	1	0
s Brimsdown Lamp Works	2	2	0
m Morton, P.	0	10	6
m Hawes. F. B. O.	1	1	0
l m Hawes, F. B. O.	10	0	0
d Ashton, H. M., Ltd.	0	5	0
d Ormiston & Sons	3	3	0
d Brit. Elec. & Allied Mfrs.' Assn.	250	0	0
s Wilson, E. C.	0	10	6
d Falk, Stadelmann & Co.	5	5	0
d Anderson, John, & Sons	2	2	0
d Gillespie & Beales	1	1	0

The letter coming before each of the names signifies the following:—
m, Member; *s*, Subscriber; *d*, Donor; *l m*, Life Member; *l s*, Life Subscriber.

PARLIAMENTARY.

Bingley Tramways.

ON June 25th and 26th Sir J. Compton Rickett's Select Committee of the House of Commons considered the Tramways Provisional Order Confirmation Bill, which, amongst other orders, confirmed the Provisional Order granted by the Board of Trade to the Bingley Urban District Council authorising the construction of a tramway through the urban district of Bingley, and connecting with the tramways of the Bradford Corporation.

MR. DILLON, who appeared for the promoters, explained that the tramway would be just over 3 miles long, and at Shipley it would connect with the Bradford Corporation Tramway, and provide a means of communication between Bingley and Bradford. The only opposition came from the West Riding County Council, who asked that certain roads should be widened, and the promoters, whilst agreeing that these roads required widening, contended that a large portion of the cost should be borne by the County Council.

MR. H. BOTTOMLEY, surveyor to the Bingley District Council, estimated the cost of the tramway at £11,000, after allowing for the sale of purchased land.

MR. C. J. SPENCER, general manager of the Bradford Corporation Tramways, said the tramways would be worked by the Bradford Corporation as part of their system.

Other evidence having been given in support of the Bill, the surveyor to the West Riding County Council was called by MR. WEDDERBURN, and he urged on the Committee that a large share of the cost of the proposed widenings should fall on the Urban District Council.

The Committee passed the Bill, subject to the condition that the cost of widening Cottingley Bridge should be equally divided between the County Council and the Urban District Council of Bingley. With regard to the widening of Rushworth Corner, they fixed that the County Council should contribute two-thirds and the U.D.C. one-third; and that the cost of widening Main Street should be borne as to one-fourth by the County Council and three-fourths by the District Council.

Electric Tramways (London).—Mr. Kellaway asked the President of the Local Government Board what was the total amount, and the amount per vehicle, paid last year in rates (1) on the track; (2) towards road making and maintenance; (3) toward cost of road widenings, by the London County Council tramways and the motor-omnibus companies, respectively, in the administrative county of London.—Mr. Burns, in reply, said he was informed by the London County Council that in the year ended March 31st, 1912, the amount paid by them in rates on the track of their electric tramways was £98,526, being £84 per car in use; that the estimated charge for road-making and maintenance was £120,000, or £102 per car, and that the amount paid towards the cost of road widenings was £23,030, or £20 per car. He had no information as to the rates paid by the motor-omnibus companies. Rates were not assessed on movable property.

Illumination Standards.—Mr. Watt asked whether it was the intention of the Home Secretary to appoint a Committee to inquire into the question of illumination standards; if so, would he say when it was to be appointed, of how many it would consist, and whether he would see that a Scottish member was put on it. Mr. Ellis Griffith said it was the intention to appoint a Committee, and its constitution was now under consideration. The Committee would be a Committee of experts, and questions of the representation of particular parts of the country, or particular industries, would not arise. He could not give any further details at present.

Lighting of the House of Commons.—Sir Daniel Goddard asked the Hon. Member for St. George's-in-the-East, as representing the First Commissioner of Works, whether the First Commissioner of Works would consider the possibility of substituting a modern system of gas lighting for the illumination of the House, which, whilst increasing the illumination, would greatly reduce the present cost and be far more economical than electricity; whether the present system had been in use for at least 40 years, and was now obsolete; and whether the experiments reported to have been made were experiments with electricity only, and not

with gas, under the improved conditions of modern lighting.—Mr. Wedgwood Benn replied that after consideration it appeared that incandescent mantles could not well be used, by reason of the draught from the ventilating fan, and no experiments had been made with them. The present system of lighting had been in use, with slight changes, for rather more than 40 years.

Metropolitan District Railway Bill.—This Bill came on June 25th before the Unopposed Bill Committee of the House of Lords, and was ordered to be reported for third reading.

NEW PATENTS APPLIED FOR, 1912.

(NOT YET PUBLISHED.)

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

14,036. "Electric starting and regulating switches." G. O. DONOVAN. June 17th. (Complete.)

14,056. "Turbo-field magnets." R. A. HOLBECH and A. ROLFE. June 17th.

14,063. "Means for automatically illuminating advertisements in electric trains and the like." R. H. MORGAN. June 17th.

14,087. "Mercury switches and arrangements for starting electric motors by means of the same." SIEMENS SCHUCKERTWERKE G.m.b.H. (Convention date, June 21st, 1911, Germany.) June 17th. (Complete.)

14,088. "Switches or switch arrangements for use in electrical circuits." F. BROADBENT. June 17th.

14,115. "Electric measuring instruments." BRITISH THOMSON-HOUSTON Co., LTD., and F. HOLDEN. June 17th.

14,120. "Automatic electromagnetic cut-outs." P. WESSEL and T. GYSLER. June 17th. (Complete.)

14,143. "Electric welding." A. L. JOHNSON. June 17th. (Complete.)

14,157. "Armoured electric cables." CALLENDER'S CABLE AND CONSTRUCTION Co., LTD. and C. PIPKIN. June 17th.

14,164. "Electric induction heater or furnace." A. HELFENSTEIN. (Convention date June 16th, 1911, Germany). June 17th. (Complete.)

14,178. "Electrical means of volatilising metals and the direct rapid conversion into compounds of a finely divided state." E. M. BAILEY, W. PLEWS, H. F. MCDOWELL and T. MIDDLETON. June 18th.

14,187. "Incandescent electric lamp cap." J. WILSON and W. HENDERSON. June 18th.

14,188. "Electric lampholder." J. WILSON and W. HENDERSON. June 18th.

14,189. "Braided wire electrical resistances." A. B. SOAR. June 18th.

14,190. "Electric resistances." W. F. JONES. June 18th.

14,202. "Miners' electrical safety lamps." W. THOMSON and J. H. ROTHWELL. June 18th.

14,216. "Protection for telephone wires." G. H. JONES. June 18th.

14,224. "Automatic electrical announcer." A. J. W. MUNDEN and J. M. MUIR. (Convention date, November 29th, 1911, New Zealand.) June 18th. (Complete.)

14,225. "Electrically operated announcer." A. J. W. MUNDEN and J. M. MUIR. (Convention date, January 29th, 1912, New Zealand.) June 18th. (Complete.)

14,235. "Commutating devices for dynamo-electric machines." M. DERI. June 18th. (Complete.)

14,251. "Sparking plugs." G. FARINA. June 18th. (Complete.)

14,267. "Carbon electrode for electric furnaces." PLANIAWERKE AKT.-GES. FUR KOHLENFABRIKATION. (Convention date, July 21st, 1911, Germany.) June 18th. (Complete.)

14,270. "Electric switches." H. LEITNER. June 18th.

14,271. "Electric switches." A. C. WHISH and BRITISH ELECTRIC TRANSFORMER Co., LTD. June 18th.

14,280. "Magnetic and gyroscopic compasses." E. H. CLIFT. June 19th.

14,306. "Terminal mounting and cord-gripping means for electric lampholders, adaptors, or the like." G. ST. J. DAY. June 19th.

14,317. "Telephone sub-station switching systems." W. AITKEN. June 19th.

14,318. "Telephone exchange systems." W. AITKEN. June 19th.

14,339. "Ships' compasses." L. F. FUCHS. June 19th. (Complete.)

14,354. "Method of utilising electric current for heating purposes." W. R. RAWLINGS. June 19th.

14,365. "Magneto-electric machines for combined ignition and illuminating purposes on motor road vehicles." F. R. SIMMS and SIMS MAGNETO Co., LTD. June 19th.

14,370. "Protection for telephone wires." G. H. JONES. June 19th.

14,378. "Electric measuring instruments." BRITISH THOMSON-HOUSTON Co., LTD., and A. P. YOUNG. June 19th.

14,385. "Miners' safety lamps of the electric type." J. L. HUDON. June 19th.

14,389. "Method of increasing the frequency of alternating currents by means of static transformers." H. SEFTON-JONES. (Ges. fur Drahtlose Telegraphie m.b.H., Germany.) June 19th.

14,390. "Method of and apparatus for the production of alternating currents of high frequency." H. SEFTON-JONES. (Ges. fur Drahtlose Telegraphie m.b.H., Germany.) June 19th.

14,396. "Control and use of series-wound dynamo-electric machines." H. F. HAWORTH and THOMAS TRANSMISSION, LTD. June 20th.

14,460. "Electric fuses or cut-outs." H. R. SCHULTZ. June 20th.

14,466. "Electromagnetically-controlled gas valves." COMPAGNIE DU GAZ ELECTRIQUE. (Convention date, April 17th, 1912.) June 20th. (Complete.)

14,514. "Combined windmill and dynamo-electric machinery." J. A. LEEMING. June 21st.

14,516. "Arc lamps." KORTING & MATHIESEN AKT.-GES. June 21st. (Complete.)

14,560. "Means for obtaining two separate and opposite drives from a single electric motor." H. T. HOLMES and J. KEMP-WELCH. June 21st.

14,563. "Automatic telephone systems." SIEMENS BROS. & Co., LTD. (Siemens & Halske Akt.-Ges., Germany.) (Addition to No. 7,093, of 1910.) June 21st. (Complete.)

14,564. "Electromagnetic relays." SIEMENS BROS. & Co., LTD., and W. H. GRINSTED. June 21st. (Complete.)

14,576. "Electromagnetic indicating instruments." W. J. DAVIS and C. E. HUNTER. June 21st.

14,583. "Controlling apparatus for electric motors." The Hon. R. C. PARSONS. June 21st.

14,635. "Electric fittings." BRITISH THOMSON-HOUSTON Co., LTD. (General Electric Co., United States.) June 22nd.

14,639. "Dynamos, rectifiers, turbo-generators." J. LECOCHE. June 22nd.

14,653. "Electrically-controlled signals for use in determining temperature." A. MCNAB. June 22nd. (Complete.)

14,654. "Methods of drawing fine wires of refractory metals." K. FARKAS. (Convention date, June 23rd, 1911, United States.) June 22nd. (Complete.)

14,655. "Incandescent lamps with drawn metal wire filaments." K. FARKAS. (Convention date, June 23rd, 1911, United States.) June 22nd. (Complete.)

14,658. "Signal installations for supervising the relative positions of turntables or other rotating stations." SIEMENS BROS. & Co., LTD. (Siemens and Halske Akt.-Ges., Germany.) June 22nd. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1910.

ELECTRIC FURNACES. M. Ruthenburg. 28,126. December 3rd. (May 30th, 1911.)

1911.

TRANSMITTER FOR TELEPHONE AND OTHER SOUND-TRANSMITTING INSTRUMENTS. E. C. R. Marks. (Webb.) 16,955. July 24th.

APPARATUS FOR THE ADJUSTMENT OF OSCILLATION CIRCUITS OF WIRELESS TELEGRAPH TRANSMITTING STATIONS. G. C. Dymond. (Gesellschaft fur Drahtlose Telegraphie.) 17,149. July 26th.

ELECTRIC POCKET LAMPS. A. P. H. Pouteaux. 17,281. July 28th.

ELECTRIC SWITCHES. H. J. Furneaux and W. B. Rock. 17,502. August 1st.

ELECTRIC SWITCHES FOR USE WITH TIMING OR OTHER PREDETERMINING MECHANISM. H. P. Allison and H. J. Arnold. 17,788. August 4th.

TELEPHONES. B. Gwozdz. (Convention date not granted. Addition to No. 11,234 of 1911.) 17,900. August 5th.

CERTAIN KINDS OF FITTINGS FOR ELECTRICAL CONDUITS. J. W. Brooks and A. E. Read. 18,301. August 23rd.

SYSTEMS OF ELECTRIC DISTRIBUTION. British Thomson-Houston Co. (General Electric Co.) 19,260. August 28th.

CIRCUIT ARRANGEMENTS FOR AUTOMATIC TELEPHONE SYSTEMS. Siemens and Halske Akt.-Ges. 19,645. September 4th. (October 12th, 1910.)

TELEPHONIC APPARATUS. E. A. Graham. 22,634. October 13th.

MEANS OF JOINTING AND BONDING BETWEEN LEAD COVERED OR LEAD COVERED AND ARMOURED ELECTRIC CABLES, AND CAST-IRON, WROUGHT IRON OR MILD STEEL SLEEVES OR JOINT-BOXES. R. B. Mitchell and F. J. Cooper. 22,868. October 17th.

MEANS FOR VARYING THE INDUCTANCE OF ELECTRIC CIRCUITS. G. Schiefer-stein. 23,283. October 21st. (Patent of Addition not granted. Divided application on No. 12,978 of 1911. May 30th.)

AUTOMATIC REGULATORS FOR ELECTRIC WELDING APPARATUS. Ges. fur Elektrotechnische Industrie. 23,943. October 28th. (October 29th, 1910.)

METHOD OF MANUFACTURING ELECTRIC STEEL CASTINGS. G. Fisher and B. Schudel. 27,377. December 6th. (December 7th, 1910.)

LIGHTING OF MOTOR-DRIVEN VEHICLES BY ELECTRICITY. H. Leitner. 27,482. December 7th.

ELECTRIC DISTRIBUTION SYSTEMS. J. Bijur. 28,391. December 16th. (December 21st, 1910.)

1912.

JOINTS FOR ELECTRIC CONDUCTORS ENTERING VACUUM APPARATUS. Y. Sakai. 38. January 1st. (January 7th, 1911.)

CIRCUIT ARRANGEMENTS FOR CONNECTING A TRUNK LINE TELEPHONE EXCHANGE WITH THE SUBSCRIBERS OF A LOCAL AUTOMATIC EXCHANGE. Siemens Bros. and Co. (Siemens & Halske Akt.-Ges.) 528. January 6th.

MANUFACTURE OF DIES FOR WIRE-DRAWING AND THE LIKE. British Thomson-Houston Co. (General Electric Co.) 536. January 6th.

CONSTRUCTION OF ELECTRICAL ACCUMULATOR. P. Marino. 2,575. January 31st.

Memorials to the "Titanic" Engineering Staff.

—The Institute of Marine Engineers is promoting a memorial to the engineering staff of the *Titanic*, every member of which lost his life whilst keeping the pumps and electric light going to the last moment. Only those who have been through the mill can realise the splendid courage and devotion of these men, who, taking no thought for themselves, and obedient only to the call of duty, steadfastly remained at their posts, knowing as they must have done that the great ship was doomed. There is no case on record where British engineers have failed in their duty on a sinking ship; but this instance is marked by the exceptional magnitude of the disaster. The engine-room staff consisted of no fewer than 35 persons, of whom 6 were classed as electricians—namely, Messrs. Peter Sloan (chief), A. S. Allsop, H. Jupe, A. P. Middleton, A. G. Irvine and W. Kelly. No finer staff of engineers ever went to sea, and we commend their memory to our readers. A special issue of the *Journal* of the Institute of Marine Engineers contains portraits and biographical notices of them all, and contributions to the Memorial Fund may be sent to the Secretary, 58, Romford Road, Stratford, London, E. A memorial is also to be erected on the banks of the River Mersey; a strong Committee has been formed, and contributions may be sent to Mr. A. J. Maginnis, the chairman, 10, Drury Lane, Liverpool. It is intended that the fund shall provide also for the erection of memorial tablets or other records in other seaports.